

MAORI LAND AFFORESTATION LEASES

by

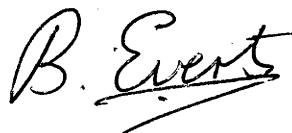
B. EVERTS

July 1978

A substantial essay submitted in partial fulfilment of the requirements for the degree of Master of Science in Forest Management at the Department of Forestry, Australian National University.

STATEMENT OF ORIGINALITY

Except where otherwise acknowledged, this thesis
is my own original work.

A handwritten signature in cursive script, reading "B. Everts". The signature is written in dark ink and is positioned above the printed name.

B. EVERTS.

ACKNOWLEDGEMENTS

I wish to thank the Australian National University for awarding me a Master Degree Scholarship which enabled me to undertake this work.

To all persons, too numerous to mention individually, who provided information, comments and useful discussion, my grateful thanks. Without their contributions this work would not have been possible.

To my supervisors, Mr. E. D. Parkes and Mr. K. Groves, for their help in providing useful discussion, encouragement and editorial work, my gratitude to you both.

Finally, my thanks to Mrs. S. Pinter who typed the final copy.

ABSTRACT

A significant portion of the current expansion of the exotic forest estate in New Zealand is taking place on Maori land. Because of the strong traditional ties between the Maoris and their land, Maori land is rarely offered for sale; instead large areas have been leased under long term agreements usually of 99 years duration.

By investing their land in afforestation, Maori land owners have a choice of either receiving an annual rent or more usually to receive a lump sum share of stumpage revenue at the time of clearfelling. Because Maori land owners have generally preferred revenue sharing schemes, the leases have basically become joint venture afforestation schemes, based on the Maori's contribution of land and the lessee's contribution of forest establishment and management costs.

Three methods have been used to calculate the lessor's share of stumpage. Two of them (the Grainger method developed by Grainger (1969), and the discounted revenue method) are based on residual valuation techniques that use a predetermined rate of return on the lessee's investment and allocate the residual as return to the lessor's land. The third method (the internal rate of return method) attempts to share revenue equitably at the time of clearfelling according to the respective contribution of the lessor and lessee. This method requires the land to be independently valued.

Changes in forest management practices, and errors made by Grainger in his calculations, have rendered Grainger's method incorrect and it is not recommended for use in its present form. The discounted revenue method contains a serious error in the method of calculating the lessor's share of stumpage which should be corrected before this method is used in future leases. For both the Grainger and discounted revenue methods, the lessor's share of

stumpage revenue is calculated before the lease is signed and remains fixed for the duration of the lease. This is not satisfactory as the relative contribution made by the lessor and lessee are unlikely to remain constant during the whole term of the lease, usually 99 years.

Revenue sharing lease agreements effectively give Maori land owners equity in the forest and a share of the risk and uncertainty involved. As a result, Maori land owners have the right to participate in decision making, a right that has not been recognised to date, but which must be included in future lease agreements.

Tax concessions instigated to promote private investment in forestry only benefit the lessee. Because the lessor is also a private investor investing in forestry, changes are required to allocate the land owner a fair share of these concessions.

A comparison of the lessor's returns from an annual land rent with the returns from revenue sharing showed an annual land rent to be the best financial option available to the lessor. However, an annual land rent does not give the lessor equity in the forest or the right to participate in decision making.

A nationally uniform approach to Maori land afforestation leasing should be formulated based on the ten years of existing experience, thereby preventing loosely worded lease agreements and reducing variation in lease conditions. The task of collecting experience, providing information and guidance for potential lessors, and acting as a representative for Maori land owners involved in afforestation leases could be carried out by the Department of Maori Affairs.

CONTENTS

	<u>Page</u>
Acknowledgements	i
Abstract	ii
List of tables	vii
List of figures	ix
List of appendices	ix
 Chapter 1. <u>Introduction and aims.</u>	 1.
 Chapter 2. <u>General background.</u>	 5.
2.1. Literature review.	7.
2.2. Development in the use of Maori land.	8.
2.3. Expansion of the New Zealand forest estate.	 10.
2.3.1. Current expansion.	10.
2.3.2. Prospects in New Zealand Forestry.	11.
2.4. Afforestation leases on Maori land.	16.
2.4.1. Benefits for the Maoris.	16.
2.4.2. Benefits for the lessee.	17.
2.4.3. Afforestation by Maori owners.	17.
2.4.4. Advisory services for Maori landowners.	 19.
2.4.5. Protection of land owner interests.	 20.
2.5. A recent development.	20.
2.6. Discussion.	22.
 Chapter 3. <u>The structure of leases.</u>	 24.
3.1. Objectives of the lease.	24.
3.2. Duration of the lease.	26.
3.3. Obligations of the lessee.	27.
3.3.1. Forest establishment and management.	 27.
3.3.2. Legal obligations.	29.
3.4. Lessor's obligations.	31.

	<u>Page</u>
3.5. Other agreements.	31.
3.6. Receipts other than from the sale of timber.	35.
3.7. Expiry of leases.	36.
3.8. Arbitration.	37.
3.9. Risk and uncertainty - managerial. and biological.	38.
Chapter 4. <u>Returns to the lessor.</u>	40.
4.1. Returns before harvesting commences.	40.
4.2. Returns after harvesting commences.	41.
4.2.1. A definition of stumpage for use in leasing.	43.
4.3. Methods of allocating revenue.	43.
4.3.1. The Grainger method.	44.
4.3.2. The discounted revenue method.	60.
4.3.3. The internal rate of return method.	68.
4.3.4. The N.Z. Forest Service approach to leasing Maori land.	75.
4.4. Risk and uncertainty - the market.	77.
4.4.1. The market.	77.
4.4.2. The lessee's effect on the market.	78.
4.4.3. Forced risk sharing.	78.
4.5. Trends in costs and revenues.	79.
4.5.1. Stumpage trends.	79.
4.5.2. Cost trends.	81.
4.5.3. The interaction of stumpage and cost trends.	82.
4.6. Discussion.	82.
Chapter 5. <u>Land valuation for afforestation leases.</u>	84.
5.1. Definitionsof land value.	84.
5.2. The economic theory of land value.	86.
5.3. Market land value.	87.

	<u>Page</u>
5.3.1. Ascertaining market land value.	88.
5.3.2. Government influence on market land values.	89.
5.3.3. Valuing leasehold land for forestry in practice.	89.
5.3.4. The market value of forestry land.	90.
5.4. The demand and supply of Maori land for forestry leases.	90.
5.4.1. Demand.	91.
5.4.2. Supply.	92.
5.5. Forestry versus agriculture - profitability and land prices.	93.
5.5.1. A comparison of the net earnings from forestry and agriculture.	93.
5.5.2. A recent land use study.	95.
5.5.3. Discussion and free market land values.	96.
5.6. Land values and land clearing costs.	99.
5.7. Increases in real land values.	101.
5.8. Discussion.	103.
Chapter 6. <u>The effects of taxation.</u>	105.
6.1. The N.Z. Forest Service.	105.
6.2. Income tax.	105.
6.2.1. Private companies.	105.
6.2.2. Maori land owners.	106.
6.3. Tax incentives.	107.
6.4. Export incentives.	111.
Chapter 7. <u>Comparison of revenue sharing and annual rent.</u>	113.
7.1. The advantages and disadvantages of annual rent.	113.
7.2. The advantages and disadvantages of revenue sharing.	114.

	<u>Page</u>
7.3. Combined annual land rent and revenue sharing.	116.
7.4. Comparison of alternatives.	117.
7.5. Combined forestry and grazing leases.	120.
7.6. Increased investment by the lessor.	120.
7.7. Discussion.	121.
 Chapter 8. <u>Leasing in Fiji and possibilities elsewhere.</u>	 122.
8.1. Fiji afforestation leases.	122.
8.1.1. General background.	122.
8.1.2. The basis of afforestation and role of government.	123.
8.1.3. Returns to the landowners.	124.
8.1.4. Comparison to land leasing for forestry in New Zealand.	125.
8.2. Possibilities elsewhere.	126.
 Chapter 9. <u>Discussion.</u>	 128.
 List of references.	 135.
List of personal communications.	138.
List of unpublished material.	139.

PageLIST OF TABLESTable

2.1.	Estimated production of forest products in roundwood equivalents.	12.
2.2.	Use of exotic log production.	13.
2.3.	Net gains in the exotic forest estate 1969 to 1976.	15.
4.1.	Classification of forest land for leasing.	46.
4.2.	Expenditure compounded to year 40 at $3\frac{1}{4}\%$.	47.
4.3.	Forest revenue compounded to year 40 at $3\frac{1}{4}\%$.	49.
4.4.	The lessor's share of revenue and residual land values.	52.
4.5.	Contributions to forest investment - first crop.	70.
4.6.	Contributions to forest investment - second crop.	72.
5.1.	Land values in New Zealand - forestry land.	90.
5.2.	Net annual income from forestry.	94.
5.3.	Average net annual income from grazing - North Island.	94.
5.4.	Net present worths for alternative land uses.	95.
5.5.	Alternative land uses facing farmers.	97.
5.6.	Free market land values.	98.
5.7.	Trends in real rural land values.	102.
6.1.	Contributions to forest investment - after tax.	110.
7.1.	Annual land rent compounded to year 22.	118.
7.2.	Stumpages required to equate lessor's income with annual land rent.	118.

LIST OF FIGURES

	<u>Page</u>
Figures 4.1. Trends in real stumpages	80.

LIST OF APPENDICES

1. Maori land law.
2. Standard conditions of lease - agricultural leases.
3. "Forest planting" - information booklet.
4. Maraetai model cash flows.
5. Stumpage trends.
6. Prices indexes.
7. Forestry cost trends.
8. Net annual income from forestry and grazing.
9. The rate of return from forestry and agriculture.

CHAPTER 1.

INTRODUCTION AND AIMS

Leasing large blocks of Maori land for afforestation purposes in New Zealand started in 1966 when the New Zealand Forest Service leased the 1160 ha. Tainui-kawhia block from the Maori owners. The object of the lease was to establish an exotic forest for timber production and to halt the inland movement of sand dunes. The first private enterprise agreement for afforestation of Maori land was in 1967, when Tasman Pulp and Paper Company negotiated with the owners to exchange their land for equity in a new afforestation company. All subsequent agreements for afforestation of Maori land between land owners and private companies have been leases, whereby the land owners do not lose the freehold of their land.

Since that time, leasing Maori land for afforestation has increased rapidly. At the end of 1977 the N.Z. Forest Service had leased approximately 70,800 ha while private enterprise had leased a further 34,000 ha. Altogether this represents about 13% of the total area of exotic forest in New Zealand. Hood (pers. comm. 1977) reported that the N.Z. Forest Service was negotiating a further seven leases and expected to be invited by various Maori Incorporations and Trusts to undertake more. Similar lease negotiations for other areas were in progress with private companies (Liley pers. comm. 1977), these being mainly the pulp and paper companies interested in increasing their future supplies of pulpwood.

The long term nature of most leases (generally 99 years) and the methods proposed for calculating the returns due to the Maori land owners, has often resulted in protracted negotiations between lessor and lessee. However, the full implications of long term leasing and the methods used to determine the returns to the land owners are only now being examined in more depth. Maori land owners, who can now see

the shortcomings of some of the earlier lease agreements, are now pressing for more favourable conditions, especially in their negotiations with private companies. However, there has generally been a genuine desire on the part of both parties to reach satisfactory agreements.

In October 1976 a report to the Minister of Maori Affairs proposed a Committee of Enquiry into long term leasing of Maori land for afforestation purposes. One of the main reasons for this was the "unnecessary bitter rancour developing from misunderstandings and the expensive and lengthy court hearings which should be avoided by the pooling of knowledge already available" (Anon unpubl. 1976a). This referred in particular to the Ngatihine lease, which at that time was subject to lengthy and expensive court hearings to resolve disagreement between the trustees representing the Maori owners. Unfortunately the Commission of Enquiry never eventuated.

This essay aims to examine critically Maori land afforestation leases from the lessor's point of view. Unfortunately lessees claimed that the terms and conditions of individual leases were strictly confidential between lessee and lessor. This meant that specific leases could not be examined, and only a general critical analysis of principles and methods can be presented.

The general background to and development of leasing of Maori land is discussed in chapter 2, including a discussion of a current controversy and the desirability of a more thorough investigation into long term afforestation leases on Maori land. Chapter 3 examines the structure of the lease document and discusses the legal requirements and obligations placed on the lessee and the lessor.

The three main parts of this essay examine critically the methods used to calculate the lessor's return from an afforestation lease, the valuation of the lessor's

contribution to the lease i.e. the land, and the effects of taxation.

Three methods have been used to calculate the lessor's return; the Grainger method (Grainger 1969), the discounted revenue method, and the internal rate of return (IRR) method. An economic analysis of each method, together with a critical review of assumptions and shortcomings, is presented in chapter 4. The evaluation of each method is based on its ability to share revenue between lessor and lessee in an equitable manner, reflecting the contribution each has made to the afforestation project.

The IRR method requires the land to be valued. As the land is not sold, an objective measure of its value does not exist. Chapter 5 examines critically the principles and methods of land value and land valuation as they apply to afforestation leases. The effect of changes in the legal definition of 'land value' and 'improvements' is discussed.

Taxation is important both from a national and an individual lessor's point of view. Chapter 6 critically examines firstly, taxation as it affects afforestation leases, and secondly the equity of tax concessions devised specifically to increase private forestry investment.

Chapter 7 discusses the alternative forms in which the lessor can receive his returns from an afforestation lease, and which enable the lessor to obtain a variable level of equity in the forest grown on his land. Fiji is one of the few places, other than New Zealand, where land owned by traditional indigenous land owners has been leased for afforestation purposes. The leasing of this land for forestry in Fiji is examined in chapter 8. Similarities and differences in leases between the two countries are examined, and the possibilities of leasing for forestry in other areas of the world are discussed.

The final discussion, together with the conclusions and general recommendations are presented in chapter 9.

CHAPTER 2.

GENERAL BACKGROUND

Two types of Maori land lease exist in New Zealand, agricultural leases and forestry leases. Agricultural leases are generally let under the auspices of the Maori Trustee (see appendix 1), and returns to the lessor are an annual rent based on the value of the land as determined by the Government Valuation Department (see section 5.1.).

The returns to land owners from an afforestation lease are usually a share of revenue at the time of clear felling, and because the Maoris contribute the land and the lessee contributes forest development and management costs, afforestation leases are essentially joint ventures. Because forest revenues depend on factors under the control of the lessee, but over which the lessor has little or no influence, Maori land owners have a vested interest in the afforestation program and how it is run. One main factor is the choice of product ultimately sold. This lack of control or influence by the Maoris forms the basis of much of the current discussion in lease negotiations.

The lease document used for afforestation leases has generally been a modification of the standard Maori Trustee lease agreement for agricultural leases (appendix 2), but as the lessor's income is a share of revenue, various obligations have been placed on the lessee with regard to his establishment of a forest. These are discussed further in chapter 3.

Purchasing Maori land is complicated by multiple ownership and was usually not acceptable to the land owners. The consent of all beneficial owners is required before a sale can be sanctioned by the Maori Land Court. A. D. McKinnon proposed in 1965 that the N.Z. Forest Service should investigate leasing as a means of making available Maori

land for forestry (Grainger 1969). Grainger proposed a system of deferred rentals whereby the lessor received a proportion of revenue when the wood grown on his land was sold. This proposal was based on the unsatisfactory aim of rough justice for all, and more recent efforts have attempted to develop methods to more accurately reflect the lessee's and lessor's equity in an afforestation project as a basis for revenue sharing.

Afforestation leases on Maori land have evolved considerably over the twelve years of their existence. The scene has changed from a situation where only one potential lessee existed i.e. the N.Z. Forest Service, to one of increasing competition for lease areas. Potential lessors now have considerable bargaining power in negotiations because of increased competition between potential lessees and a better understanding of the implications of leasing land for afforestation purposes. Recent lease negotiations have become more protracted as an increasing number of contentious issues are raised and discussed. Most of these concern the relatively complicated methods used to determine the lessor's return which in most leases depends directly on the actions of the lessee, and the desire for meaningful involvement in the afforestation project by the land owner.

The general philosophy of the Maoris on land ownership is that the land belongs to those who have died, those who are living and those yet to be born, and that land is therefore a trust passed on from generation to generation. As a result, there is not as much opposition to waiting for a whole rotation length before income is received as might be found if a deferred rental was offered to a European lessor. This is sometimes used as an argument in favour of a deferred rental scheme for Maori lands. However, the present generations of Maoris also don't want to leave all the income from the land to future generations, they want something now and something later. Some of the later lease agreements have

made provisions for this and allow for payments in advance at an interest rate of generally 6%. This move could be considered to be one step back to the system of annual rental payments, used for agricultural leases.

2.1. Literature review

Very little specific to leasing of land for forestry in New Zealand has been published. Grainger (1969) outlined the formula proposed by the N.Z. Forest Service for leasing undeveloped forest land on a deferred rental system regardless of ownership. Grainger's approach aimed at converting the economic rental from an afforestation project to a predetermined percentage of future stumpage revenues. Payments to the lessor depended on a land classification according to topography and vegetation, and varied from 1% to 25% of stumpage revenue depending on land class. The Grainger method has been superseded by other methods but is more fully discussed in chapter 4 because of its historic importance.

A considerable amount of unpublished material on leasing land for afforestation is held by the N.Z. Forest Service, most of which was prepared by their Economics section. The Forest Service claimed this material was confidential, and as a result it was unavailable to the writer for use or comment.

Mathur (1975), Misra (1975) and Rustagi (1977) describe the leasing of land for afforestation from the State Forestry Department in India. Although this is not the same as leasing from native or customary land owners, the problem of determining a fair return to the land owner still exists. Rustagi suggests that compensation for the use of the land should be based on the use of Faustmann's formula, using the State Government borrowing rate. However, he does not indicate its practical application, nor does he discuss the shortcomings of the formula. The shortcomings were discussed by Grainger (1968)

Carter (1978) describes the background to the protracted lease negotiations between Carter Holt Ltd. and the Ngatihine trust, which have failed to reach a satisfactory conclusion after 7 years. Molloy (1978) discusses forestry cooperatives as an alternative to Maori land afforestation leases with reference to the Ngatihine lease. The Ngatihine controversy is examined in more detail in section 2.5.

2.2. Development in the use of Maori Land

Most Maori land was originally covered in indigenous forest, most of which had been cut and milled by the 1950's, the land generally being left without further development. Those areas near urban centres were generally leased under the auspices of the Maori Trustee for agricultural purposes. The more remote areas remained unutilised as there was no pressure for agricultural use. The depression years of the 1930's and the 1939 - 1945 war contributed to the lack of incentive for the further development of these areas of Maori land, and in many cases developed or partially developed land was abandoned, or badly neglected. As a result much land reverted to scrub and fern or became eroded during these periods. These events were usually followed by a migration of Maori people away from their tribal lands to towns and cities (Gillanders-Scott pers. comm. 1978).

The Department of Maori Affairs made considerable efforts to get Maori lands into economic production based on a system of loans which the Maori owners had to pay back out of farm profits. However, the rapid rise in land development costs and failure of agricultural incomes to keep up with rising costs in the early 1960's, severely curtailed further development of Maori farms. Although loans were on very favourable terms, it was over 30 years before Maori owners received any disposable income (Hingston pers. comm. 1978). In Northland, which has many of the present afforestation leases, much of the land was dug-over kauri gum land, which was either too difficult or too expensive to put into grass. In many cases no funds were available anyway (Gillanders-Scott pers. comm. 1978).

In this general climate leasing for afforestation purposes was mooted, and naturally any proposal which would give a reasonable return to the land owner was considered. The N.Z. Forest Service's first venture into leasing was on a deferred share of stumpage basis. The private sector approached it differently. In 1966 Tasman Pulp and Paper Company formed a separate company to afforest the Tarawera valley, Tarawera Forests Ltd. After initial Tasman Pulp and Paper Co. proposals were rejected, the Maori land owners in the valley were given shares in the new company in proportion to the value of their land holdings, the capital structure of the company being based on contributions in land and finance at the end of the development period of the forest. Forest development costs were capitalised and it was estimated that at the end of the development period the nominal capital of the company would be owned 76.7% by Tasman Pulp and Paper Co., 8.9% by the Crown and 14.4% by the Maoris. This compares to the initial land contributions of Maoris 15,380 ha. (50%), the Crown 7690 ha (25%) and Tasman Pulp and Paper Co. 7690 ha. (25%). This combined venture had the backing of the New Zealand Forest Service, the Department of Maori Affairs, Treasury, the Lands department and the Maori Land Court (Groome pers. comm. 1977).

However, compared to the subsequent deferred rental schemes offered by private companies, the Tarawera Forests Ltd. arrangement is now considered to be very poor. The Maoris effectively lost the freehold of their land and are now only minority shareholders in a large company. Also returns to the Maori shareholders are delayed until about the 25th year, and then only come in the form of dividends from a Board which is controlled by Tasman Pulp and Paper Co. There are some hopes for a future renegotiation of this particular arrangement (Groome pers. comm. 1978).

Subsequent arrangements with private companies were based on a lease and a deferred rental.

2.3. Expansion of the New Zealand forest estate

Of the approximately 300,000 hectare increase in the total exotic forest estate in New Zealand over the last ten years, about one third has taken place on leased Maori land. Maori leases have become of increasing importance because :

(a) it allows financially productive use of the land while Maori ownership is retained

(b) leasing enables the lessee to expand his forest without having to buy land.

2.3.1. Current expansion

New Zealand exotic forest policy in the mid 1960's aimed at achieving national self-sufficiency in softwood products and at promoting a steady growth in softwood exports. This policy necessitated a steady growth in the forest estate to supply the anticipated increase in domestic and export demand for wood. In 1969 the New Zealand Forestry Development Council recommended a 21,000 ha per annum increase in exotic forests, to be shared by the private and government sectors, and local bodies. This was raised to 28,300 ha per annum in 1972 to ensure the export earnings from the forestry sector were maintained at at least 9% of total export earnings.

During the forestry boom from 1964 to 1969, internal cash flows formed over 60% of the total funds available to private forestry companies (Smith 1974). Such funds generated a general climate of expansion within the private sector.

A report to the Forestry Development Council (1969) noted that "a survey of prospects in the long term indicates strong justification for increased planting of forests in New Zealand", and that "export development had taken place and shown the ability of the New Zealand producers to meet overseas requirements in regard to quality, service and price".

More recently the impetus for forest expansion has been strengthened. Based on what O'Neill (1974) called an "existing and increasing world shortage of forest products", the 1974 Forestry Development Council decided on a minimum annual increase in the exotic forest estate of 44,000 ha. Existing forests can sustain wood using industries already established, and can meet projected domestic demand for forest products beyond the year 2000, so that new plantings will have to be absorbed by the export market. This market is anticipated to consist of both logs and processed forest products.

The government's policy of increased afforestation in the private sector has been stimulated by forestry incentives. The 1965 budget introduced a tax concession whereby forest expenditure by private companies could be deducted from taxable income received from other sources. This considerably reduced the real cost of investment in forestry. The Government Forestry loans scheme was first introduced in 1963 giving low interest, long term loans to private investors with provisions for writing off some of the loans. This was replaced in 1970 by the current Forestry Grants Scheme which provides for a Government grant of 50% of forest development costs to approved forest growers. The company tax concession and the grants scheme are discussed further in chapter 6.

2.3.2. Prospects in New Zealand forestry

Because of increasing demand for wood products at home and overseas, the feeling in New Zealand is one of optimism. Table 2.1 illustrates the increasing total production and the increasing reliance of the New Zealand forest product industries on exotics. Table 2.2. illustrates the significance of the log export trade.

Table 2.1
Estimated Production of Forest Products In
Roundwood Equivalents (000 m³)

<u>Year ending</u> <u>31 March</u>	<u>Total</u> <u>Production</u>	<u>Exotic</u> <u>Production</u>	<u>Percentage Exotic</u> <u>Production</u>
1939	1613	226	14
49	2513	968	39
54	3118	1497	48
59	3967	2394	60
64	5156	3826	74
69	6885	5906	85
70	7810	6778	87
71	8189	7176	88
72	7960	7012	88
73	8240	7351	89
74	9924	9006	91

Source: N.Z. Forest Service
 Statistics of the Forest Industries of
 New Zealand to 1974.

Table 2.2

Use of Exotic Log Production (%)

<u>Year Ending</u> <u>31 March</u>	<u>Domestic</u>			<u>Export</u>	
	<u>Saw</u> <u>Logs</u>	<u>Peeler</u> <u>Logs</u>	<u>Small</u> <u>Wood</u>	<u>Pulp</u> <u>Logs</u>	<u>Chips</u> <u>Logs</u>
1939	91		9		
49	95		4	1	
54	93		3	4	
59	75	1	2	20	2
64	60	1	3	28	8
69	51	1	4	20	24
70	48	1	4	19	1 27
71	47	1	5	18	3 26
72	45	1	5	19	3 27
73	45	1	6	17	4 28
74	44	1	3	33	3 15

Source: N.Z. Forest Service

Statistics of the Forests and Forest
Industries of New Zealand to 1974.

Anon (unpubl. 1974) predicted there would be a general reversal of the trend of increasing significance of log exports shown in table 2.2 because of rising New Zealand demand and the raw material needs of larger pulp and paper plants. At that time the major log exporters said that the proportion of logs being exported would decline to be replaced by higher exports of processed wood products. Table 2.2 suggests this trend is already apparent in 1974. The implication for leasing is that there will be less opportunity to take advantage of the higher stumpage rates on export logs. One of the major log exporters was New Zealand Forest Products Ltd, who also lease Maori land. It is unlikely such a company would export logs grown on leased land when they could export logs grown on their own land and retain all the higher revenues within the company, although this depends on location and commitments.

Anon (unpubl. 1974) notes that the log export trade may phase out in 20 to 25 years time so that forest planning should consider domestic processing developments, and the raw material required. A three year study noted in the New Zealand Forest Research Institute's 1975 annual report (Anon 1976c), analyzed long term export prospects and their effects on present day management decisions, and concluded that New Zealand's greatest long term export opportunities lay with high quality sawn timber and plywood, and that forest management should aim to maximise the production of clear grades of radiata pine. Fenton (1972) notes that "the generally unexploited comparative advantage of a high rate of diameter increment in New Zealand, with or without added log quality through pruning, can be best utilised by development of exports of peeler logs, veneer or plywood".

Considerable confidence by both the government and private sector in the future of New Zealand forestry is indicated by recent planting rates exceeding the proposed expansion rates outlined in section 2.3.1., especially when

it is realised that the growth in the private sector has exceeded that for the state sector in the last few years as indicated in table 2.3.

Table 2.3.

Net Gains in the Exotic Forest Estate

1969 to 1976 (ha)

<u>Year</u>	<u>State Plantings</u>	<u>Private Plantings</u>	<u>Total</u>	<u>% of Total by Private Sector</u>
1969	13,500	5,000	18,500	27
70	12,490	5,140	17,630	29
71	11,740	8,320	20,060	41
72	11,830	12,790	24,620	52
73	16,670	12,400	29,070	43
74	20,010	18,570	38,580	48
75	21,344	22,976	44,320	52
76	22,300	25,900	48,200	54

Source: N.Z. Forest Service

Annual Report of the Director-General of
Forests 1970 to 1977

Investment by the small investor is also increasing. In the period 1963 to 1970, 9,300 ha were planted under the forestry loans scheme. From 1970 to 1973 more than 7,300 ha were planted under the forestry grants scheme, an additional 30,000 ha being approved for planting (Anon unpubl. 1974).

There are proposals for large scale expansion by at least two private companies, both relying heavily on leased Maori land, both in the King country - Taumaranui area. New Zealand Forest Products Ltd. plans a 51,000 ha expansion (Anon 1977d), and Winstone Afforestation Ltd., in conjunction with other companies, has options to buy or lease about 10,100 ha (Groome pers. comm. 1977).

Based on a predicted demand for exports there appears to be considerable confidence by investors in New Zealand forestry. However, the Australian Bureau of Agricultural Economics (Anon 1977a) examined the export prospects for Australian forest products and concluded that a future world wood shortage was unlikely. It did, however, expect certain regions of the world, notably Japan and Europe, to continue to buy large quantities of wood from other regions for some time. If a world wood shortage does not eventuate and New Zealand fails to find markets for the wood that will be produced from the current expansion program, there will be a very large over-supply and stumpages will fall accordingly. Much of the wood may be unsaleable and the returns to lessors in revenue sharing leases will suffer accordingly.

2.4. Afforestation leases on Maori land

2.4.1. Benefits for the Maoris

The benefits to the Maori land owners in an afforestation lease are:

(a) Unused land is utilised without loss of ownership. The use of otherwise unused land may be more important nationally than to individual owners who may only own a very small piece of land.

(b) There is a financial return to the owners where previously there was none. This is important to rural communities living on or near tribal lands.

(c) The provision of work. Afforestation leases are generally more labour intensive than agricultural leases and it is not unusual to have a clause in a forestry lease providing for the use of local owner labour where ever possible. However, the owners often feel that this is only a 'sweetener' for the lease and the employment of local labour will not eventuate, especially in times of high national unemployment. Local investment also has its effects through local employment multipliers.

Afforestation leases provide the opportunity for Maori land owners to play some part in a project with which they can be identified. This is important in some rural Maori communities such as is Northland for example, an area long considered an economic backwater. By providing work and some form of identity afforestation leases are helping to stem the urban migration of younger people. More young people remaining in tribal areas strengthens ties with the land and within the rural community (Hingston pers. comm. 1978).

2.4.2. Benefits for the lessee

By signing what is generally a 99 year lease, the lessee has most of the benefits of land ownership without having to buy the land. This means the lessee is able to afforest about twice as much land with the same amount of finance. Pressure for land in New Zealand is increasing, and as most of the large blocks of undeveloped land belong to Maoris and are not for sale, leasing allows an afforestation company to expand where otherwise it may not have been able to do so.

The cost to the lessee is usually a share of stumpage revenue at the time the timber is sold.

The stumpage payments made by the lessee to the lessor are tax deductible for the lessee. Where the company processes the timber itself, only a small proportion of its sale value has to be found for payment to the lessor.

2.4.3. Afforestation by Maori owners

Although keen on afforestation, Maori land owners lack the finance and expertise to do it for themselves. Even if the finance is available there is a general reluctance to go into a new venture on the part of the land owners because of lack of confidence (Hingston pers. comm. 1978).

Maori land owners have access to lending institutions but it is difficult to borrow money for land development without mortgage security. Multiple ownership often prevents this. The Maori Lands Board, through the department of Maori Affairs, may lend money for the development and settlement of Maori land. This procedure does not affect legal ownership, but the rights of the owners are suspended whilst the Board has the right to exclusive occupation of the land on behalf of the owners. However, the Department of Maori Affairs' policy is for agricultural development and this means of financing has yet to be used for forestry development.

Although Maori land owners would qualify as private investors eligible for a grant under the Forestry Grants Scheme, the law prevents them from getting both a grant and a Department of Maori Affairs loan. A grant only provides 50% of forestry costs. Thus, unless there is another source of finance available to the owners, there is little chance to undertake their own afforestation projects.

Molloy (1978) suggests forestry co-operatives as an alternative to leasing using owner labour, supported by the technical and financial backing of the N.Z. Forest Service. However, funds available through the N.Z. Forest Service are limited to the Forestry Encouragement Grants, and Molloy makes no suggestion as to the source of the remaining capital required.

One potential source of finance is income received from afforestation leases. By leasing some land to an afforestation concern, Maori land owners can retain the rest and proceed with their own afforestation with the proceeds. One example of this already exists involving 45 ha. A second has been proposed involving 400 ha (Groome pers. comm. 1978).

2.4.4. Advisory services for Maori landowners

Unlike the agricultural advisory services available to Maoris, the Department of Maori Affairs does not provide an advisory service on afforestation and normally does not become involved in forestry except as an adjunct to large scale farming (Anon pers. comm. 1978a). The Official New Zealand Yearbook (Anon 1976a) states that Maori land development policy is to settle Maoris on farms which will provide an adequate standard of living. The general failure of the Department of Maori Affairs to keep up with forestry development is shown in the 1975 Report of the Maori and Island Affairs Department which notes that "there is a growing interest in afforestation as a means of using Maori land. Where forestry is the major undertaking, a profit sharing lease whereby the planting and tending of the forest is undertaken by the New Zealand Forest Service or a private timber company, appears to offer the best prospects". However, afforestation leases are revenue sharing rather than profit sharing schemes, and although leasing may offer the best prospects of getting Maori land into productive use, whether or not it offers the best prospects for the land owners is debateable.

Although the Department of Maori Affairs has in preparation a booklet outlining the relative merits of growing pulpwood and sawlogs (see appendix 3), it invariably advises Maori land owners to engage professional forestry consultants (Anon pers. comm. 1978a).

Government advisory services to Maori land owners contemplating afforestation leases are poor, especially with respect to the long term implications of 99 year leases. To some extent this has been overcome by the use of private consultants.

2.4.5. Protection of land owner interests

Before 1968 all leases of Maori land were subject to confirmation by the Maori Land Court. This was to protect the land owner. The Maori Affairs Amendment Act of 1967 changed this and leases of Maori land are now only endorsed by the registrar of the court. Gillanders-Scott (pers. comm. 1978) considers that this change may be attributable to a greater ability on the part of the owners to manage their own affairs. As Chief Judge of the Maori Land Court he still sees a need to safeguard against an over-enthusiastic body of owners who wish to get into an afforestation agreement with lessees with insufficient funds for such a venture. In most cases the advice of an independent forest consultant is required and no lease agreement can be executed unless it is approved by a barrister approved by the court. However, as observed by Judge Gillanders-Scott, the Maori Land Court's function is to "hear and determine" applications within the Court's jurisdiction. The Court is not an advisory service.

2.5. A recent development

A controversy involving the Ngatihine Trust and 6000 ha of land in Northland has dragged on for several years and shows no sign of abating. The trust was set up in 1974 and consisted of seven members. Negotiations were initiated with Carter Holt Ltd, an afforestation company, to arrange a revenue sharing lease, such a lease requiring the signature of all the trustees. When negotiations were nearly complete, another company, Northern Pulp Ltd, offered a blanket 25% of stumpage revenue for all land leased, a higher percentage than that being offered by Carter Holt Ltd at the time. One of the trustees refused to sign the Carter Holt Ltd lease proposal, arguing that the land should be put out to open tender (Alexander pers. comm. 1975). The dissenting trustee was dismissed from the trust by the Maori Land Court but was reinstated on appeal to the Appellate Court, though ordered to sign the lease agreement. Despite an improved offer from

Carter Holt Ltd, the trustee had not signed by late 1977, and a new application for his dismissal as a trustee was heard in December 1977 (Anon 1977b). This was successful and the lease was signed by the remaining trustees.

After the lease was signed, one of the signees changed his mind saying that not all owners were consulted in the proceedings, and that most owners were left out of the original selection process for trustees some 3½ years before (Anon 1977c). The originally dissenting trustee was actively opposing the lease and trying to return effective control of the land to the Maori owners. He also indicated that only two of the trustees signing the lease were shareholders in the block of land.

The Chairman of Carter Holt Ltd stated that the company was bound by the terms of the lease (Anon 1977c). He also indicated that even if the company wanted to it could not renege on the lease. Some of the improvements made by the company in the conditions of the lease included an increase in the share of revenue going to the lessor, a reduction in the term of the lease from 99 to 75 years, and substantial monetary payments to the lessor before harvesting commenced.

The Northland Trade Unions support the Maori owners and have placed a "green ban" on the land to prevent Carter Holt Ltd starting their afforestation program. Their reason for imposing the green ban is that they consider that the Maoris are "not getting a fair deal" (Anon 1977c).

Carter Holt's latest move has been to approach the trust to give the opportunity for all shareholders who are opposed to the lease, to withdraw and have their combined interest in the land partitioned out of the trust (Carter 1978

Future developments in this controversy are unpredictable. Ngatihine land owners have called for a commission of enquiry into the Maori Affairs Act and the powers of the Maori Land Court, who they feel has pressured them into the lease agreement. Even if the owners do regain control over their land, there is no readily available source of funds for them to develop their own large scale forestry project.

One important point arising from the Ngatihine controversy is that the afforestation company has not withdrawn from the negotiations, but instead was able to considerably improve on its original offer to the land owners. This would suggest firstly, a considerable demand for land suitable for leasing, and secondly, the forestry companies' leasing proposals are inadequate and usually not in the best interests of the Maori land owners.

There is little doubt that the Ngatihine controversy has stimulated other disputes e.g. the Te Hapua 42 block, a 1242 ha block leased to Northern Pulp Ltd in 1974, but now subject to owner resistance. In addition recent negotiations between New Zealand Forest Products and the owners of Puketapu 3A broke down due to the failure on the part of the company to agree to meaningful participation of the Maori owners in the afforestation program (Groome pers. comm 1978).

2.6. Discussion

The current controversies and changes in leasing agreements are part of the evolution of leasing for afforestation purposes. Initially a system was proposed and accepted, but as points of contention arose, and Maori land owners found their demands for better conditions were being met, the system and whole philosophy of afforestation leases changed. Should the owners, in the case of the Ngatihine trust be successful in regaining control of their land, an important precedent will have been set, and leasing agreements will

change significantly.

A meaningful involvement in the management of their land is becoming the paramount factor in lease negotiations. Presently once a lease is signed, the owners have virtually no say in the use of their land for 99 years. Profit maximising companies are not keen to have the land owners partake in the decision making process.

Those land owners who signed the original lease agreements, and who see neighbouring leases receiving much better conditions, may wish to have the conditions of their own leases changed. This is likely to be a potential source of controversy and is already giving concern to the N.Z. Forest Service (Kirkland pers. comm. 1977). A standard uniform approach to the leasing of Maori land would prevent this.

The success of leasing as a joint venture depends on New Zealand's ability to export its forest produce in the future. The current feeling is one of optimism, but a failure to find markets will result in a domestic glut of forest products, and a minimum return, if any, to the Maori land owners.

CHAPTER 3

THE STRUCTURE OF LEASES

The structure and wording of each lease agreement depends on the forestry organisation involved and the legal entity drafting the lease. Based on five lease drafts made available to the writer, the important sections of most leases are defined and some important differences between leases examined. Special clauses related specifically to a particular lease are not considered since they do not have general application.

Long term afforestation leases usually contain the following major sections :-

- Objectives of the lease
- Duration of the lease
- Obligations of the lessee
- Obligations of the lessor
- Other agreements
- Receipts other than from the
sale of timber
- Expiry of the lease
- Arbitration
- Returns to the lessor

Returns to the lessor, are discussed in chapter 4. Managerial and biological risk and uncertainty is an area not adequately covered in afforestation leases. This is discussed in section 3.9.

3.1. Objectives of the lease

The basic objective of a lease is to establish a forest on the lessor's land. The following examples illustrate this;

Example 1. "The lessee shall establish a forest of *Pinus radiata* or other fast growing exotic trees on the said land.. manage and protect such forest and cut away and remove

or sell for cutting and removal the produce....operations shall be carried out in accordance with good forestry practice so as to produce a high yield of merchantable forest produce...".

Example 2. uses basically the same wording as example 1 except for the last phrase which becomes: "so as to produce a continuing yield of pulpwood from the said land".

Example 3. states the objectives of the lease as being "to alienate the said land by way of lease exclusively or principally for afforestation purposes".

The N.Z. Forest Service sometimes includes a range of objectives as exemplified by the Lake Taupo Forest Trust lease's objectives, which are as follows;

- (a) Preventing soil erosion, reducing pollution of Lake Taupo....
- (b) Conserving and protecting fish and wildlife....
- (c) Preserving and safeguarding...graves,.... historic and sacred places,...areas of natural beauty,....scenery,....unique vegetation,....
- (d) Consistent with the above purposes; establishing, managing and protecting a forest or forests.... so as to achieve the maximum financial yield."

Though all the above objectives aim at establishing, managing and protecting an exotic forest, and eventually selling the forest produce there-from, there are important differences.

In only one case is radiata pine (*Pinus radiata* D. Don) specifically mentioned, and then only as "Pinus radiata or other fast growing exotic trees". Although it is generally accepted in New Zealand that radiata pine is the most profitable exotic species, lease agreements are often not specific and the lessee is not necessarily obliged to plant the most financially productive species. The N.Z. Forest Service under its "maximum financial yield" policy is

obliged to plant radiata pine wherever the climate is suitable.

The product or products to be produced were only specified in one lease (pulpwood), although some lease agreements specify a group of products e.g. "pulp, sawlogs or other forest produce". However, the product to be grown has a very important role in determining the actual returns to the lessor. Should New Zealand be successful in its plans to become an exporter of a large quantity of high quality forest products, the stumpage differential between pulpwood and sawlogs will have a significant effect on the eventual income to the lessor. The following example of stumpage differentials applies to the United States Market for 1972 (Anon unpubl. undated a):

Pulpwood	- \$US 3 per m ³ .
Low quality sawlogs	- \$US 20 per m ³ .
High quality sawlogs	- \$US 45 per m ³ .

At present New Zealand stumpages are low because of isolation from world market forces. However, should they come to reflect the same differentials as the United States, larger shares of stumpage from pulpwood leases will have to be paid to equate absolute income with that from high quality sawlog leases. For example, using the above stumpages, only 6.7% of the high quality sawlog stumpage would be required to equate income with a lessor receiving 100% of the pulpwood stumpage. The aim of "a high yield of merchantable forest products"; or the aim of growing pulpwood but specifying "the maximum financial yield", are thus quite different to the N.Z. Forest Service's unqualified "maximum financial yield". Under the latter high quality sawlogs would have to be grown.

3.2. Duration of the lease

Most leases are for a period of 99 years. Two notable exceptions are the largest existing lease areas both held by the N.Z. Forest Service; Lake Taupo Forest Trust of 28,640 ha

and Lake Rotoaira Forest Trust of 32,100 ha, both of which have a 70 year tenure. Examples of the definition of tenure are as follows:

Example 1. "....do hereby lease the said land....for a term of ninety-nine (99) years which shall commence or be deemed to have commenced on the 1st day of....197....".

Example 2. "The lessors do hereby lease unto the lessee....for a term commencing on the....day of....and extending until the 31st day of March next following the 99th anniversary of the commencement of planting....which shall have commenced within three years of the commencement date above stated....".

Leases are usually quite specific about duration. The second example given, however, leaves the starting date open for three years, allowing effective tenure for up to 102 years. There are moves to correct this (Liley pers. comm. 1977) so that in future terms are defined precisely.

3.3. Obligations of the lessee

The lessee has two basic obligations. These are with respect to the establishment and management of the forest and his legal obligations.

3.3.1. Forest establishment and management

All leases oblige the lessee to establish and manage a forest, the following example exemplifying the format used;

"The lessor....doth hereby covenant and agree....that the lessee, consistent with the objects of this lease.... will at its own expense establish, manage and protect a forest on the said land of Pinus radiata trees or other fast growing exotic trees for the production of....in accordance with sound forestry principles (including but not limited to) planting, re-seeding and re-planting of cut over areas, building of roads and fire-breaks and other improvements and protecting of trees from fire, insect and disease and generally in such a manner as will produce the

highest yield....at the earliest reasonable and practicable time."

Often a minimum establishment period is provided for, for example, 20 years. The definition of such a period is important to the lessor as the longer some of his land lies idle, the later his returns arise. Generally there are no provisions made for subsequent plantings or defining the maximum rotation length to be applied. Both these are generally controlled by the lessee, though both can have a considerable effect on the lessors' returns. Both could be subject to manipulation by the lessee especially under unfavourable economic conditions.

The afforestation obligation is generally qualified by a number of conditions, including;

(a) The right to cut any merchantable native timber, either at the ruling market rate or for final disposal by the lessee for the lessor. The N.Z. Forest Service allows for the lessor to remove any native timber with the permission of the Minister.

(b) The right not to plant areas the lessee considers too steep or too inaccessible or likely to be eroded or required for road works or fire breaks.

(c) The liberty not to clear and plant under or adjacent to any power or telephone transmission lines. For example "the lessee....may in its discretion leave unplanted beneath and adjacent to such lines an area or width greater than the minimum area or width required....". This seems an absurd condition since it could allow the lessee not to plant at all!

(d) Most leases make provision for the preparation of an initial forest management plan, a copy of which is to be supplied to the lessor. One purpose of these plans is to inform the lessor of what the lessee proposes and presumably to allow for discussion on contentious points, though this is not provided for in the lease agreements. Generally the

lessee is able to vary the management plan as required to suit his requirements. In some current lease negotiations, lessors are asking to be allowed to participate in forest management. This has arisen for two reasons, firstly concern by lessors that the lessee may not carry out "good forestry practice so as to produce a high yield of marketable forest produce", and secondly concern by the lessors about mismanagement by the lessee such that areas may require replanting. Under the present system there is nothing to prevent such re-establishment costs from being charged against the total investment and thus reducing the returns to the lessor. Both concerns reflect the lessor's interest in getting the maximum financial yield from their land. However, to allocate to each party a share in decision making appropriate to their shares in the investment as a whole is impractical, and the lessee, being the major risk taker, must be the major decision maker.

(e) **Roading:** The lessee is obliged to construct and maintain all necessary roads, bridges, culverts, fences, skids and such like works.

The lease makes the lessee responsible for establishing and managing a forest. As long as the economic climate for forestry projects remains good, there is unlikely to be any argument over the definition of the lessee's obligations. However, under conditions where forestry became uneconomic, there are many areas that could become contentious.

3.3.2. Legal obligations

When leasing land there are a number of legal requirements on a land owner that pass over to the lessee. The lessee, for all intents and purposes, becomes the owner of the land except for land tax purposes. Generally a number of specific Acts are mentioned, including:

Fencing Act 1908: This requires the lessee to pay half the total fencing costs of any fence between the leased land and an adjacent property. Most leases provide that this shall

not apply if the adjacent land is owned by the lessor. Although land leased by the N.Z. Forest Service becomes subject to the Forest Act 1949, which classifies all leased forests as crown land exempt from the Fencing Act 1908, the Forest Service generally agrees to pay half the fencing costs.

Forest and Rural Fire Act 1955: This Act authorises levies to cover the costs of such things as mandatory fire control and weather watching.

Noxious Animals Act 1956: This Act covers the mandatory destruction of deer, thar, chamois, wild pigs, wild goats, wallabies, and opossums. Land owners may be rated under this act to cover the costs of control measures against noxious animals carried out by the N.Z. Forest Service.

Noxious Weeds Act 1950: This Act covers the mandatory destruction of noxious weeds. Land owners may be rated to cover the costs of weed control measures undertaken by the Department of Agriculture.

Agricultural Pests Destruction Act 1967: This Act covers the destruction of all agricultural pests. Land owners may be rated to cover the costs of pest destruction measures taken by the Department of Agriculture.

Though not all leases specifically mention all the above mentioned Acts, enough are generally included to ensure the lessee is regarded as the owner of the land for rates, levies and other assessments.

All leases contain a general indemnity clause the same as or similar to the following; "The lessee doth hereby indemnify and save harmless the lessor against any liability at law for any injury or damage occurring to person or property resulting from any act or omission by the lessee, its servants or agents in carrying out the objects of the lease or otherwise upon the said land."

3.4. Lessor's obligations

Generally the only obligation placed on the lessor is that he should allow "quiet enjoyment" of the leased land by the lessee. For example: "...the lessee shall have and enjoy full quiet and undisturbed occupation of the said land and the lessor shall abide by all reasonable directions given by the lessee to enable the objectives of this lease to be fulfilled.... the lessee is entitled to enjoy possession of the said land as if he owned it in a legal estate in fee simple".

3.5. Other agreements

The following is a list of general agreements made between the lessor and lessee. Although the wording may differ from lease to lease, the content is essentially the same.

(a) Subletting: The lessee shall not at any time during the term of the lease assign, sublet or part with possession of the said land or any part thereof for the whole or any part of the term of the lease, except with the permission of the lessor and then only in order to achieve the objects of the lease. Exceptions to this are: the right to allow other persons to enter the land and to cut and remove the forest produce whether they be employees of or contractors to the lessee; the right to provide dwellings and the operation of amenities for employees and others engaged in work upon the said land; and in some cases the right to sublet for grazing purposes. The lessor may or may not get first option on grazing rights.

(b) Power of removal and contract: The lessee has the power to cut, remove and dispose of forest produce from the said land. It also has the power to contract with other persons to do the same.

(c) Right of entry; The lessor's right of entry to view varies, but generally he has to provide seven days notice, and the lessee, if he wishes, can require that the person making such an inspection be accompanied by an officer or

representative of the lessee. The lessee also has the right to defer an inspection if the proposed time is not acceptable "on management grounds". This includes, but is not limited to, the fire risk existing at any one time. In only a few cases does the lessor have an unrestricted right to view. Since afforestation leases are supposed to be joint ventures the general limitations on the lessor's right to view impose an unnecessary restriction. The lessor shares in the risks taken in afforestation in proportion to his input to the total investment and should have access at all reasonable times without restrictions.

(d) Generally all leases also provide for access by the Maori land owners with the permission of the lessee for preserving and safeguarding graves and any other historic and sacred places of the Maori people and for hunting and fishing.

(e) Notification of breach of lease: Generally all leases provide for notification of breach of lease, generally by written notice. Most leases allow for a period of ninety days to start the work necessary to comply with the covenants and agreements made in the lease. As all lessees have full knowledge of their obligations under the lease agreements this ninety day period of grace should be unnecessary.

(f) Minerals and mining: Generally the lessee is not entitled to remove as "forest produce" any earth, rock, shingle or other minerals as part of the utilisation of the land. However, such materials may be used free of charge for purposes connected with the objects of the lease such as building and maintenance of roads, bridges, culverts, fences, skids and buildings. Most leases allow the lessor to "extract sand, shingle, metal, rock or other minerals from the said land and to establish, maintain and work a quarry or quarries on the said land". If the lessor should exercise this right then he has to pay a fair share of the costs of any roads used by him, and a fair share of all rates. Some leases include millable indigenous timber under this section.

(g) Default in performance: In some cases, if the lessee does not carry out the covenant conditions or other provisions of the lease agreement, the lessor may enter the land and rectify any defaults in performance on the part of the lessee. All costs incurred by the lessor can be recovered under the Distress and Replevin Act 1908, including interest charges of 10% per annum. In other cases leases provide for a termination of the lease at the option of the lessor in the event of a default for a period exceeding three months, three months arrears of rent for example. Since the Lessee has full knowledge of all the lease requirements there should be no defaults.

(h) Rent in arrears: All leases are subject to the Property Law Act 1952 which allows the lessor the right to enter and distrain upon the land for rent in arrears and dispose of such distresses until all rent in arrears and any costs involved in such an action are met. Section 118 of the Property Law Act 1952 requires notice to be served before such action can be taken. Most leases specify a three month period before the Property Law Act can be invoked. The lessor has the choice of collecting the rent under the Property Law Act, or terminating the lease, or both. However, none of the leases make adequate provisions for such a termination as by law any improvements on the land (including the forest) revert to the landowner although the lessee has equity in the forest. Such provisions should be included as a termination on the basis of the present agreements could lead to involved legal wrangles over compensation.

(i) Uncontrolled causes of default: Most leases contain a clause releasing the lessee from all covenants and agreements made under the lease agreement in the case of default due to factors beyond the lessee's control such as

Acts of war by the Queen's enemies.

Restrictions and prohibitions of government.

Taking of land by proclamation.

Disease, blight or infection of timber.

Any other causes beyond the reasonable control of the lessee.

Any relief applies only to such areas and for such time as the uncontrollable factors impose themselves, except that if it appears that the objects of the lease may be frustrated, either party may apply to the other for a termination of the lease. Again the terms of equity in any residual crop are not covered in the event of such a termination. Fire as an uncontrollable cause of default is discussed in section 3.9.

(j) Legal and consultation costs: All leases provide for the lessee to pay all legal costs involved in the draughting, compilation and registration of the lease as well as any consultation or advisory costs incurred by the lessors in the lease negotiations. In some cases this is limited to a predetermined fixed amount. Most Maori land owners as individuals, trusts or corporations have little if any finance. This provision allows for the signing of a lease agreement to the satisfaction of both parties and prevents later accusations of lessees having taken advantage of lessors.

(k) Registration and approval: All leases are subject to the Land Settlement Promotion and Land Aquisition Act 1952 which requires registration of the lease for approval by the Supreme Court. Before 1967 all leases of Maori land also required the approval of the Maori Land Court.

(l) Options to buy land: Under the Maori Affairs Act 1952, no lease of Maori land may include an option to purchase. Any sale must be completely independent of any rights to land as may apply under any lease agreement. Some leases, however, contain a clause which effectively gives the lessee the first option to buy if the lessors decide to sell. Under this clause the lessor must advise the lessee he wishes to sell and at what price. The lessee then has six months to accept or reject such an offer. If the offer is rejected the lessor then has two years to sell the land at a price not less than the price stated in the notice to sell. If an acceptable offer is made by a third party less than that stated in the notice to sell, the lessee has two months within which it may purchase at that price. If the lessee again refuses, the lessor may then sell at any price. The provisions of the lease continue to

apply to the land despite its sale, unless sale is to the lessee. These provisions restrict the rights of the lessor to sell to whom he pleases.

(m) Other clauses: Various other clauses exist which are contained in some leases only, but which could be included in all leases. The following list is extensive but not exhaustive;

The lessee is deemed to be the owner of the forest.
 Any areas not forested are available to the lessor
 for private use with permission from the lessee.
 Provisions to add land to the lease.
 Regulations concerning the lessor's cattle.
 All notices to be in writing.
 All notices to be delivered by registered mail.
 The lessee not to give easements or access rights
 without the lessor's permission.

3.6. Receipts other than from sale of timber

Most leases make some provision for receipts in addition to those from forest products. These include grazing receipts and receipts by way of compensation for land taken by the crown or any public authority under the Public Works Act 1928. Generally, compensation is shared between lessors and lessees equitably. Thus any compensation for land or minerals belongs solely to the lessor, compensation for any forest produce is shared on the same basis as receipts from the sale of such produce and compensation for any improvements other than the forest belong solely to the lessee.

Grazing receipts are generally shared in a similar manner to receipts from forest produce, though cases where they go entirely to either the lessor or the lessee exist. Since afforestation leases are revenue sharing enterprises to which the lessor's input is the land, any revenue derived from the use of the land should benefit the lessor. It could be argued that as the lessee does not provide any input for grazing all the returns should accrue to the lessor.

Conversely, as the lessee effectively becomes the sole user of the land under the lease, then the lessee should profit from grazing returns. However, leases are a joint venture on a revenue sharing basis, and thus the returns from grazing should be shared. The basis for sharing need not necessarily be the same as that for stumpage sharing.

3.7. Expiry of leases

All leases make provision for lessee and lessor to meet at a time equivalent to about one rotation before expiry of the lease to discuss the operation of the forest in the last rotation, the cost liability for those trees which would not be taken as a final crop during that period, and whether or not there is to be an extension or renewal of the lease. If no agreement is reached, then for the remaining period of the lease all costs are to be deducted from royalties payable to the lessor and the lessor will have full ownership of the forest after the expiry of the lease without compensation to the lessee. In some leases the lessor is given the opportunity to determine the state of the land at the expiry of the lease by being able to opt for a discontinuation of replanting for the last rotation period. He is thus able to continue to receive his full share of stumpage revenue, and take back the land in an unforested condition.

The lessor can be forced to pay for continued afforestation and land planted in the last few years of the lease may not become available for other uses for another rotation period effectively extending the lease for that period if the lessor is not interested in continued involvement in forestry. Actual economic conditions in 99 years time are impossible to predict and options must be left as open as possible. The uncertainty involved is an argument for leases with shorter terms. Should the lessor have and exercise the option not to reforest in the last rotation period of the lease the question of what happens to the land arises. Although the land remains

under the control of the lessee until the expiry date, land not reforested should not be left unproductive. An opportunity exists here to revert the control of the land back to the owner as the last crop is progressively clearfelled, for the owner to use for other purposes.

In some leases the lessee claims another three or five year period after the expiry of the lease to cut and remove all marketable forest produce remaining. Presumably this would only apply in the case where the lessee had paid the full cost of growing the trees and not charged the costs against royalties due to the lessor, in which case the lessor would be the sole owner of the trees, or the lessee would in fact be forcing the lessor to sell to the lessee exclusively. Any such extension of the period allowed to cut forest produce again effectively adds to the term of the lease.

Most leases allow the lessee six months after the expiry of the lease to remove buildings and fixed machinery, unless the lessor wishes to keep them and pays compensation. The lessor generally has to notify the lessee not later than six months before the expiry of the lease that he wants to keep such buildings and fixed machinery.

Although the conditions applying at the expiry of a lease may be rigorously defined, the provision for meeting and discussing the future of the lease and subsequent management one rotation length before expiry allows for changes of conditions and requirements by mutual agreement at that time.

3.8. Arbitration

All leases provide for arbitration under the Arbitration Act 1908 in the event of any dispute or difference arising that cannot be settled by mutual discussion and agreement. The Act provides for the appointment of two arbitrators.

Telfer (unpubl. 1977), notes that "laymen and some lawyers are attracted to arbitration because they believe that it provides a cheap, expeditious and 'practical' means of resolving disputes. Experience in numerous cases has shown that these beliefs are delusive and that arbitration is an unsatisfactory method of settling disputes in comparison with proceedings in a court of law". The reasons quoted are:-

(a) Arbitration is generally more expensive. Much of the costs involved in legal proceedings are borne by the State, where-as arbitration is paid for by the parties involved.

(b) Arbitration is more time consuming. In legal proceedings a Judge will continue with a case until it is completed, everybody concerned having to attend at the Court's convenience. An arbitrator may be a busy lawyer or other professional man, who can only sit at intervals and generally tries to meet at the convenience of all involved. This again increases expenses.

(c) Arbitration is less satisfactory. Legal proceedings can determine admissability of evidence, the meaning and effect of contractual provisions etc. throughout the proceedings. Generally, arbitration covers an unnecessarily wide area because devices adopted in a court of law are only used to a limited extent. Often matters of contention in arbitration finish up before a court of law anyway.

Telfer recommends that arbitration clauses be omitted from lease agreements. He suggests instead that leases should be written so there is no risk of a submission to arbitration, and instead, points of contention referred to an impartial expert who will deliver a final decision on his own.

3.9. Risk and uncertainty - Managerial and biological

The lessor is subject to risks and uncertainties involved in investment in forestry. Some of these risks and

uncertainties are subject to control by the lessee. As the lessor does not have a similar degree of control it is questionable whether the lessor should have to take a full share of the risk, or at least have his interest protected from risks over which only the lessee has any degree of control.

Areas of risk over which the lessee has some control are management and the risk of loss from biological factors such as disease and insects and fire. Although some leases provide that the lessee will "restock any area on which the trees are damaged by fire, weather, insect or disease, killing or destroying all existing timber growth", there are no provisions as to who should bear the costs involved. Presumably the lessee and lessor share the cost of the loss, the lessor writing off the establishment and tending costs, and the lessor having lost his share of stumpage. However, in the case of mismanagement, or failure to take sufficient preventative action against fire, insect or disease attack, the lessee would be at fault and the lessor should not have to share the loss.

The risk from fire could be covered from compulsory fire insurance. Although the fire risk is not great (Fenton unpubl. 1969) it would give some protection to the lessor's potential revenue. The managerial and biological risk are more difficult to protect against. There have been attempts to ensure that the lessor has some say in forest management (Liley pers. comm. 1977), but generally lessees are reluctant to allow this. They claim that as the value of the lessee's inputs to that of the lessor are likely to be about 9 to 1, the lessee has the major vested interest and should therefore control management.

Risk and uncertainty are not adequately covered in lease agreements.

CHAPTER 4.

RETURNS TO THE LESSOR

From the lessor's viewpoint the most important factor in a joint afforestation scheme is the returns that he will receive when the forest produce is sold. Although some afforestation leases offer the lessor the choice of an annual land rent based on land value, the most commonly used method of remunerating the lessor is a sharing of forest revenue, which for the lessor is basically a deferred rent. In this chapter the methods used to determine the share of revenue for both lessor and lessee are critically reviewed and their implications examined.

Most existing leases give the lessor a fixed percentage of stumpage revenue. One of the major weaknesses of a fixed share of revenue is that the share is based on expected costs, and consequently it cannot incorporate actual changes in the costs experienced throughout the term of the lease, which could favour one party at the expense of the other. Forecasts of future movements in stumpages and costs based on the extrapolation of past trends are presented in this chapter in order to examine the consequences of such changes.

4.1. Returns before harvesting commences

Most existing leases provide for a 'peppercorn rental' of 12.36 cents/ha/annum to be paid to the lessor until stumpage revenue becomes available. Such a payment was first suggested, but not justified, by Grainger (1969). Most leases do not specify whether the peppercorn rental applies to the gross area or the net plantable area of a lease. The

lessor's share of stumpage revenue is not adjusted with respect to the peppercorn rental.

Alternatively, some lease agreements offer an annual payment to the lessor until stumpage revenue becomes available. There is no method prescribed to calculate this payment and it

is not based on area or land value; its value is usually decided upon by mutual agreement between the two parties.

The lessor's share of stumpage revenue is not adjusted with respect to the magnitude of this annual payment.

Most of the more recent lease agreements include the option whereby the lessor can receive payments in advance, either as a lump sum or as a series of periodic payments, from his share of the anticipated returns. Generally advance payments incur a 6% per annum interest charge, the principal and any accumulated interest being deducted from the lessor's share of revenue when it becomes available.

4.2. Returns after harvesting commences

Lease agreements vary in their definition of revenue which is to be shared by the lessor and the lessee. Some examples are:-

1) "For the purposes of calculating rent or royalty, (a) if the timber is sold to a third party, stumpage will be the amount received by the lessee in respect to the market value of such timber. (b) if the timber is cut and extracted by the lessee, then stumpage shall be that proportion of gross sales receipts from the produce so as would be allocated as stumpage as provided for in (a) above. (c) if the timber is utilised by the lessee, then the lessor may elect to have a percentage of the crop equivalent to the lessor's percentage share of stumpage revenue to be put out for public tender and the monies received shall be stumpage as provided for in (a) and (b) above."

2) "Stumpage is the weighted average stumpage paid by the lessee for wood from all other sources, excluding those where a special purchasing price exists."

3) "Stumpage value means the weighted average wood value (less reasonable logging and cartage costs) paid in a particular financial year and the immediately preceding financial year for wood landed by the lessee at the lessee's

nearest appropriate processing plant from all sources other than those in which the lessee is a participant in a profit sharing afforestation lease or is the owner or part owner of the particular forest."

4) "Current market stumpage is the amount that a third party might fairly and properly be expected to pay at the time timber is removed."

5) "The stumpage used is that stumpage which can properly and fairly be considered to have been received if the produce had been sold to a third party on the open market."

All the above examples lack a clear definition of a pricing point for determining stumpage, although examples 1 and 3 suggest that the pricing point is for standing timber. Log sales are commonly made at three different pricing points, these being:-

- (1) on the stump or standing timber.
- (2) on the skids in the forest. This includes felling and extraction costs.
- (3) at the mill door. This includes felling, extraction, loading and transport costs.

Obviously the unit sale price rises with each stage of harvesting. Each example does, however, allude to or mention market stumpages i.e. the price that logs are sold for on the open market. This suggests that competition is involved in determining the stumpage. The log market is discussed in section 4.4 and stumpage trends in section 4.5.

Those examples using a weighted average stumpage to determine the revenue that is to be shared between lessor and lessee could be unfair in that an average can only be based on previous sales. Unless changing money value and changes in real stumpage rates are taken into account, stumpage price changes over time will mean that a weighted average stumpage will under or over-estimate the current market stumpage. As a result the absolute returns due to the lessor will also be under or over-estimated.

4.2.1. A definition of stumpage for use in leasing

The lessor's contribution to most afforestation leases is the land on which the trees are to be grown. Consequently his share of stumpage revenue should be calculated using the value of the standing trees at the time of harvesting. The land makes no other contribution and hence the lessor has no equity in any operation other than growing trees.

Any further reference to stumpage in this essay, unless otherwise qualified, will refer to the standing or on the stump value of the timber.

4.3. Methods of allocating revenue

There are three methods used to determine the lessor's share of stumpage revenue in lieu of land rent.

- 1) The Grainger method.
- 2) The discounted revenue method.
- 3) The internal rate of return (IRR) method.

The first method was developed by Grainger (1969) who attempted to calculate the percentage of stumpage due to the lessor for six land classes based on topography and vegetation cover before afforestation.

The Grainger method was designed for all land without allowing for location or site productivity, both important factors in forest profitability. The discounted revenue method was introduced in an attempt to derive a percentage of stumpage that would be applicable to a specific lease area, rather than to all areas. Both the Grainger method and the discounted revenue method used a predetermined interest rate and were based on current costs and returns.

The IRR method attempts to get away from a predetermined interest rate and the assumptions inherent in using current costs and returns. It does this by calculating an internal

rate of return at the time the trees are harvested, using historical costs and actual revenues to divide up revenue rather than a predetermined sharing arrangement. This method was first introduced by one of the larger private forestry companies although it has been investigated by the New Zealand Forest Service (Williams pers. comm. 1977). One of the most important changes involved in this method is the need to value the contribution made by the Maori land owner to the total investment.

4.3.1. The Grainger method

(A) The model

The method formulated by Grainger (1969), was derived using the economic model constructed for a joint forestry - agriculture land use study based on the Maraetai block as described by Ward et al (1966). A full understanding of the model required the writer to go back to the more detailed forestry data used in the Maraetai model presented in Fenton and Grainger (unpubl. 1965). Grainger did not always explain where his figures came from, nor did he explain the steps involved in the revenue sharing calculations adequately.

The Maraetai model was based on the use of radiata pine with 90% of the forest managed under a sawlog regime using a 36 year rotation, and the remaining 10% of the forest managed under a pulpwood regime using a 20 year rotation. However, as sawlogs were restricted to the first three logs from each tree, the actual forest yield consisted of approximately 50% sawlogs and 50% pulpwood. In order to reflect more average circumstances, Grainger made minor changes to the Maraetai model which reduced forest revenue by \$1.98/ha/annum from year 20 to year 37 and \$4.94/ha/annum from year 37 onwards. The main change was an 8 km increase in the distance from the forest to the mill. Costs and prices were based on 1962 values

Essentially Grainger used the annual expenditure and revenue of the Maraetai model up to year 40, after which a uniform sustained yield (constant costs and revenues) situation existed. At year 40, Grainger calculated the annual residual revenue generated by the afforestation project and allocated this as a return to land. Grainger then estimated the percentage of stumpage revenue that this residual represented. Throughout his calculations Grainger assumed a 50% tax rate on all interest and revenue that could not be charged against expenditure. He attempted to incorporate this by halving the interest rate of $6\frac{1}{2}\%$. Grainger's choice of interest rate and its subsequent adjustment is discussed further in section 4.3.1. (B).

Grainger acknowledged that the degree of tending, the variability of roading costs, initial vegetation, topography and location were all likely to affect profitability. To overcome the degree of tending problem Grainger assumed a forestry enterprise of average efficiency producing mainly sawlogs. However, he was unable to include variable roading costs and location, but suggested that each lease should make provisions for a review of the lessor's share of stumpage revenue after a lapse of 20 to 25 years, this being the period in which the first intermediate revenues arise in the 36 year rotation.

The effects of topography and initial vegetation were incorporated into the model by varying the costs likely to be influenced by these factors e.g. initial clearing costs (vegetation type and slope), planting costs (slope - hand or machine plant), and logging costs (slope). Grainger combined the effects of initial vegetation and topography changes into six major land classes each with several subclasses which carried the same share of revenue for the lessor. The land classes are shown in table 4.1.

TABLE 4.1.
Classification of forest land for leasing

Land class	Topography rating	Present vegetation category	Preparation	Lessor's share of revenue (%)
1(a)	Machine planting	Light scrub, bracken, grass etc.	Burn only	25
(b)	Machine planting	Stabilized sand dunes	Nil	25
2(a)	Tractor	Light scrub, bracken, grass etc.	Burn only	20
(b)	Machine planting	Medium scrub	Crush and burn	20
(c)	Machine planting	Sand dunes	Plant marram and lupin	20
3(a)	Non-tractor	Light scrub, bracken, grass etc.	Burn only	15
(b)	Tractor	Medium scrub	Crush and burn	15
(c)	Tractor	Non-merchantable indigenous bush	"Ball and chain" and burn	15
(d)	Tractor	Sand dunes	Plant marram and lupin	15
4(a)	Non-tractor	Medium scrub	Cut and burn	10
(b)	Tractor	Heavy scrub	Cut and burn	10
(c)	Tractor	Cutover with resid.merch.timber	Burn (after logging)	10
(d)	Tractor	New indigenous cutover (1-2 yr)	Burn	10
(e)	Tractor	Merchantable indigenous bush	Burn (after logging)	10
5(a)	Non-tractor	Heavy scrub	Cut and burn	5
(b)	Non-tractor	New indigenous cutover (1-2 yr)	Burn	5
(c)	Non-tractor	Merchantable indigenous bush	Burn (after logging)	5
(d)	Non-tractor	Cutover with resid.merch.timber	Burn (after logging)	5
(e)	Tractor	Old indigenous cutover (10-15 yr)	Rootrake	5
(f)	Tractor	Non-merchantable indigenous bush	Fell and burn (refer 3c above)	5
6	Non-tractor	Non-merchantable indigenous bush	Fell and burn	1

Source:- Grainger (1969), table 2.

The Maraetai block was estimated by Grainger to be class 2 land. An expanded presentation of the calculation of the lessor's share of stumpage revenue for the whole Maraetai block is given below.

The annual forest development expenditure compounded to year 40 at 3¼% interest rate is given in table 4.2.

TABLE 4.2.

Expenditure compounded to year 40 at 3¼% (\$000)

<u>Year</u>	<u>Costs</u>	<u>Compounded costs</u>	<u>Year</u>	<u>Costs</u>	<u>Compounded costs</u>
1	138.2	480	21	205.6	376
2	63.8	214	22	199.0	352
3	76.2	248	23	197.2	336
4	88.8	280	24	188.0	312
5	78.8	242	25	188.0	302
6	121.4	358	26	120.6	188
7	94.6	270	27	129.4	196
8	90.4	248	28	120.4	176
9	96.4	258	29	129.4	184
10	96.6	252	30	121.8	168
11	129.0	324	31	130.6	174
12	149.8	366	32	129.6	168
13	142.6	338	33	137.2	172
14	142.2	326	34	137.2	166
15	142.8	318	35	136.6	160
16	144.8	312	36	133.4	152
17	144.8	304	37	131.4	144
18	140.6	284	38	398.8	424
19	124.6	242	39	227.4	234
20	116.6	220	40	227.4	228

\$10,496

Source:- Grainger (1969), appendix 2.

Costs include all direct forest costs, indirect forest costs and sawlog logging costs. Grainger adds certain external overheads, fire protection equipment costs and contingencies at a later stage, but gives no reason for not including these costs in his forest development expenditure. The total compounded cost of development of \$10,496,000 is supposed to represent the value of the lessee's investment after having paid 50% tax on the assumed return of $6\frac{1}{2}\%$ interest on invested capital.

Table 4.3 gives the compounded value of all forest revenue at year 40, after allowing for Grainger's adjustment for taxation. Revenue before year 40 is obtained from sawlog thinnings, pulpwood clearfellings and in years 38 to 40, sawlog clearfellings. Grainger treats revenue as an investment account earning $6\frac{1}{2}\%$ interest before tax. To allow for taxation, Grainger deducts costs from revenue. The remainder is taxable and only half the taxable revenue is any one year is added into the cash flow. The compounded value, in year 40, of all revenues received up to and including year 40, after allowing for taxation, amounted to \$6,022,000. A $6\frac{1}{2}\%$ return on this investment would give an annual income of \$392,000 before tax each year from year 41 onwards.

To derive the lessor's share of stumpage revenue, Grainger carries out the following calculations:-

- (1) Calculation of the lessee's net forest investment in year 40.

	(\$000)
Compounded forest development costs	10,496
Other expenditure (external overheads, fire protection equipment, contingencies - compounded at $3\frac{1}{4}\%$)	<u>1,074</u>
	11,570

TABLE 4.3.

Forest revenue compounded to year 40 at 3¼% (\$000)

<u>Year</u>	<u>Gross Forest revenue</u>	<u>Costs</u>	<u>Taxable revenue</u>	<u>Net revenue</u>	<u>Compounded revenue</u>
20	44	116.6	-	44.0	83.2
21	164	205.6	-	164.0	300.0
22	164	199.0	-	164.0	291.0
23	204	197.2	6.8	200.4	342.0
24	204	188.0	16.0	196.0	325.0
25	210	188.0	22.0	199.0	320.0
26	210	120.6	89.4	165.2	258.0
27	212	129.4	82.6	170.8	258.0
28	212	120.4	91.6	166.2	242.2
29	212	129.4	82.6	170.0	242.0
30	184	121.8	62.2	153.0	211.2
31	200	130.6	69.4	165.0	220.0
32	200	129.6	70.4	164.8	213.0
33	200	137.2	62.8	168.6	211.0
34	206	137.2	68.8	171.6	207.8
35	194	136.6	57.4	165.2	193.4
36	162	133.4	28.6	147.8	168.6
37	162	131.4	30.6	147.2	161.8
38	862	398.8	463.2	630.4	674.0
39	860	227.4	632.6	543.8	560.0
40	852	227.4	624.6	539.6	539.6
					<u>\$6,022.0</u>

Note: Grainger assumed that costs and revenues were centred
at the mid-point of each year.

Source: Grainger (1969), appendix 2 and 3.

Less sawlog logging costs (accumulated capital and operating costs - compounded at 3¼%)	480
Lessee's net forest investment	<u>\$11,090</u>

Logging costs were deducted as the land owner did not have any equity in the logging operations. Grainger, however, failed to subtract logging related salaries and logging related external overheads.

(2) Calculations of annual residual revenue.

(\$000)

Annual forest income after year 40		
Interest @ 6½% on accrued income		392
Pulpwood - 94,860 m ³ @ \$1.10/m ³		104
Sawlogs - 89,200 m ³ @ \$8.16/m ³		728
Slabwood - 19,540 m ³ @ \$1.32/m ³		26
		<u>\$1,250</u>
Less - annual sawlog logging costs	94	
- annual sawlog logging profit (10% of capital and accumulated operating costs)	48	<u>142</u>
		\$1,108
Less - annual forest operating costs	166	
- interest on lessee's net forest investment (6½% of \$10,090,000)	720	<u>886</u>
Annual residual revenue		\$ 222

The annual forest income of \$1,250,000 represents the combined actual and imputed revenue received each year from year 41 onwards. The sawlog stumpage values are an 'on the landing' value, and sawlog logging costs and profit are deducted to give an 'on the stump' forest revenue of \$1,108,000. Of this sum, \$886,000 or 80%, is due to the lessor for the current year's forest costs plus interest on his forest development capital. The lessee's share of 'on the stump' forest revenue is \$222,000 or 20%, which is the residual revenue after all the lessee's costs have been met.

Grainger's calculations only applied to the class 2 land of the Maraetai block. The lessor's share of stumpage revenue for other land classes are shown in table 4.4.

Grainger calculated residual land values for each land class. For land class 2 he argued that \$222,000 represented a 6½% return on the land value compounded to year 40 at 3½%, i.e. he assumes that the interest was taxable. For the Maraetai block, which consisted of 10,120 ha, the land value in year one was calculated as follows:-

$$\frac{\$222,000 \times 100}{10,120 \times 6.5} \quad \text{discounted at } 3\frac{1}{4}\% = \$99/\text{ha}$$

Table 4.4 summarises the residual land values for each land class.

Although Grainger's economic model would have resulted in a zero land value and a zero share of revenue to the lessor for class 6, he assigned it a nominal \$5/ha land value and a 1% share of revenue to the lessor. Although this class of land is so marginal that it would normally be regarded as unplantable it is likely to have a positive value when included as small areas within areas of a better class.

TABLE 4.4.

The lessor's share of revenue and residual land values

<u>Land class</u>	<u>Lessor's share of revenue (%)</u>	<u>Undeveloped land value (\$/ha)</u>
1	25	124
2	20	99
3	15	74
4	10	49
5	5	25
6	1	5

Source:- Grainger (1969), table 4.

The Grainger method was designed to be universally applicable to all potential lease areas. An example of its use follows:-

A field appraisal of 10,000 ha gives the following land classification:-

tractor terrain - 3000 ha light scrub : land class 2
 tractor terrain - 4000 ha medium scrub : land class 3
 tractor terrain - 1000 ha new cutover : land class 4
 non-tractor terrain - 2000 ha heavy scrub : land class 5

The lessor's share of revenue is calculated as follows:-

	<u>Ha</u>		<u>Weighted share of revenue(%)</u>
class 2	3000	30% @ 20% royalty	6.0
class 3	4000	40% @ 15% royalty	6.0
class 4	1000	10% @ 10% royalty	1.0
class 5	<u>2000</u>	<u>20%</u> @ 5% royalty	<u>1.0</u>
	10000	100%	Total 14.0%

In this case the lessor is entitled to 14% of the stumpage revenue when it becomes available.

(B) Critical appraisal of the Grainger method

Although the Grainger method was designed to yield a formula for land leasing acceptable to both land owner and investor, the method has serious flaws in concept and has been outdated by changes especially in forest management practices.

The approach taken by Grainger is basically a 'residual' approach, whereby the economic surplus available to pay for the use of the land is dependent on the interest rate chosen. Rather than reflecting the true productivity of land and capital, the method allocates a pre-determined return to capital, leaving the residual as a return to land. In Grainger's words "the investor who provides the capital necessary to render the land productive is entitled to his agreed financial return". Grainger recognised that if rates comparable to financial yields shown by industrial and commercial investments at the time were used, potential leasehold land would be negative in value. He agreed that since the main competitor for large blocks of undeveloped land was agriculture, the rate of interest that would be earned by land similar to that of the Maraetai block, if used for agriculture, should be used. Systematic surveys by the N.Z. Meat and Wool Board showed that this was $6\frac{1}{2}\%$ (Grainger 1969), although it was not stated whether this was before or after tax. Grainger did not explain why the provider of capital should get an agreed return in preference to the provider of land - both are essential forest inputs.

Grainger attempted to make his method applicable to private enterprise by considering the effects of taxation. He did this by accepting that "the lessee's investment cannot be credited with any interest that would be lost in taxation if that interest was literally receivable in cash". Consequently, he compounded costs at $3\frac{1}{4}\%$ interest rather than the full $6\frac{1}{2}\%$. However, firstly, from the point of view of individual lessees and lessors, the model should not include any allowances for taxation because of the

entirely different tax situations that may exist for lessee and lessor. The full rate of interest should be applied to all costs and the lessee's equity should not be reduced because he has other sources of income against which he can charge his forest costs. Equity should be based on full costing; the lessee and lessor can then pay taxes according to the tax scale applying to them.

Secondly, in reality, 'interest' earned by a growing forest is treated by the N.Z. Department of Inland Revenue as locked up capital, which is not taxable - only the net revenue from the eventual sale of the trees is taxable. As a result, Grainger's model does not allow for taxation at all, but uses half the real interest rate. The full $6\frac{1}{2}\%$ is only used in year 40 to calculate the "pre-tax" interest on the lessee's net investment (which was compounded at $3\frac{1}{2}\%$), and the annual income from accrued revenue.

In view of the above, it would have been more appropriate for Grainger to have used a $3\frac{1}{4}\%$ interest rate to calculate the 'pre-tax' interest on the lessee's net investment and the annual income from accrued revenue. Had he done so, the calculation of the annual residual revenue presented in section 4.3.1. (A) would have been as follows:

	(\$000)
Annual forest income after year 40	
Interest @ $3\frac{1}{4}\%$ on accrued income	211
Pulpwood	104
Sawlogs	728
Slabwood	26
	<hr/>
	1,069
Less - annual sawlog logging costs 94	
- annual sawlog logging profit 48	<hr/>
	142
	<hr/>
	927

(\$000)

Less - annual forest operating costs	166	
- interest on lessee's net forest investment		
(3¼% of \$10,090,000)	353	519
Annual residual revenue		<u>408</u>
Lessee's share of stumpage	519/927 = 56%	
Lessor's share of stumpage	408/927 = 44%	

In any event, Grainger's calculation of forest revenue compounded to year 40 is also incorrect. Grainger made no allowance for the fact that forest development costs incurred in the years before revenue became available, could be carried forward under a 'cost of bush' formula (see chapter 6) for taxation purposes, and charged against income in subsequent years. It was not until year 40 that accumulated income (\$5,918,000) exceeded accumulated costs (\$5,712,000) and a taxable income existed. This error resulted in the after tax revenue being considerably understated, which in turn reduced the interest on accrued income, the annual residual revenue and the lessor's share of stumpage.

The correct cash flow for forestry was calculated using the financial data from the Maraetai model provided by Fenton and Grainger (unpubl. 1965), and is presented in appendix 4. This cash flow excluded all logging costs (in which the lessor has no equity) and allowances for taxation. The shares of stumpage revenue for lessor and lessee calculated at both 6½% and 3¼% interest were as follows:-

Interest rate	3¼%	6½%
Lessor's share of stumpage revenue	49%	-21%
Lessee's share of stumpage revenue	51%	121%

This compares to Grainger's results of lessee's share 80%, and lessor's share 20%. The reasons why Grainger's calculations do not compare more closely to the corrected

results at the $3\frac{1}{4}\%$ interest rate are:-

(1) Grainger failed to exclude all logging costs. He did exclude the capital and accumulated operating costs but failed to exclude logging related salaries and logging related external overheads. These costs compounded to year 40, overstated the lessee's net forest investment, which in turn increased the interest on the lessee's net forest investment, and reduced the annual residual revenue and the lessor's share of revenue.

(2) Grainger charged $6\frac{1}{2}\%$ imputed interest on the lessee's net forest investment and allowed for a $6\frac{1}{2}\%$ return on accrued income. Both had been compounded at $3\frac{1}{4}\%$, and as the lessee's forest investment significantly exceeds accrued income, using the $6\frac{1}{2}\%$ interest rate rather than the $3\frac{1}{4}\%$ interest rate effectively increased the lessee's equity in absolute terms.

(3) Grainger significantly reduces accrued income by 'allowing' for taxation and not carrying forward costs incurred before revenue becomes available. 50% of the so called taxable income each year was deducted from the cash flow. This reduced the annual residual revenue and hence the lessor's equity.

The correct results at $6\frac{1}{2}\%$ and $3\frac{1}{4}\%$ suggest that for the lessor to be allocated 20% of stumpage revenue, an interest rate of about $4\frac{1}{2}\%$ should have been used.

To avoid a residual approach, Grainger could have introduced land value and shared revenue on the basis of percentage cost contribution. Assuming a land value of \$30/ha (1962 values), the following would apply for the total area of 10,120 ha.

Interest rate	3¼%	6½%
Land value compounded for		
40 years	\$1,091,198	\$3,769,520
Lessee's net forest investment		
year 40*	\$10,642,000	\$22,476,000
	<hr/>	<hr/>
	\$11,733,198	\$26,245,520
Lessor's share of revenue	9.3%	14.4%

* corrected forest investment (see appendix 4)

Grainger's use of a 3¼% interest rate indicates the N.Z. Forest Service's desire to get some of the large blocks of Maori land into production forestry. Grainger acknowledged that even "6½% was totally unsatisfactory for risk capital and therefore had to be regarded as a bedrock minimum imposed under duress", yet the N.Z. Forest Service was thus willing to accept effective returns of 3¼% in order to get the land into forestry. Grainger's calculations allow for a 10% profit on logging investment. The rate of interest to be used in assessing the profitability of forestry by the N.Z. Forest Service in 1968 was 7% (Fenton unpubl. 1969), and present day investment in forests is required to earn 10% or more, or have redeeming social advantages (Williams pers. comm. 1977).

Although Grainger used a very low interest rate, he expected a substantial improvement in forest profitability on a relatively long term basis due to increased revenues. Subsequent work by Fenton and Tustin (1972) and Fenton and Merle Dick (1972a,b,c) showed that increased profitability was possible without waiting for long term changes in revenue. They proposed single product regimes growing sawlogs for export on a much shorter rotation than the regimes used for the Maraetai models. A much higher degree of tending was involved. The increased profitability was mainly due to the higher returns expected from export logs and to the reduced effect of interest charges due to the shorter rotation. As a result of this work regimes, management practices and cash flows have changed and Grainger's 'average' approach is no

longer applicable. This applies especially to land leased for pulpwood production, where although costs are lower, the eventual return is far below that envisaged by Grainger's calculations.

Grainger claimed that his method would be applicable in the case of increased revenues, as equity was expressed only as a ratio. Both lessee and lessor would receive increased absolute amounts of money. However, their relative shares still remain a reflection of Grainger's view of the relative equity of each partner in the total project which was based on a 3½% interest rate, which was half the interest rate earned by agriculture. The fixing of relative equity in forest investment for periods up to 99 years cannot be said to be a sensible approach for either lessee or lessor. Grainger makes no comments on the applicability of his method should the rate of interest earned by agriculture change significantly.

Grainger's average approach also had other drawbacks in that both lessees and lessors soon recognised special conditions in their lease areas which Grainger had not allowed for, mainly site productivity and location, both major determinants of forest profitability. Modifications made in the use of Grainger's formula after several years use included:-

(1) Land typing after planting. After noting that land types and methods of land clearing assumed by the Grainger approach did not always reflect the actual land clearing methods used, lessors opted for a classification of the land after planting allowing the exact share of stumpage due to the lessor to be calculated. This modification involved keeping detailed records of land preparation procedures and the areas involved.

(2) Provision for advance payments. Grainger's method was based on a rental deferred to the time of harvesting. As some lessors were not prepared to wait as long as this for

returns, provisions were included in lease agreements allowing the lessor to obtain payments in advance (see section 4.1.).

(3) Locality allowance. Grainger's method was based on an average forest and lessors were quick to note that their land had special advantages in some cases. In one case the share of stumpage revenue payable to the lessor was increased several percent to allow for a favourable location.

Despite the drawbacks, Grainger's method did have the advantage of being simple to apply, requiring only an initial land class assessment to determine the percentage of stumpage revenue due to the lessor. Furthermore, a percentage of revenue was a concept easily understood by Maori land owners. Application of the method involved no complicated calculations, required no detailed records to be kept and needed no estimations of costs and revenues.

Despite the fact that Grainger himself suggested that the method should only provide a basis for contractual offer, negotiation and acceptance, the method was very strictly applied. This was high-lighted in the first lease signed by the N.Z. Forest Service using the Grainger method, an area which included a large proportion of sand dunes. Although part of the reason for afforestation was to prevent further inland movement of the dunes, the area was assessed by the Forest Service and allocated a 25% share of revenue to be paid to the lessor, the maximum provided for under the Grainger method, as the area was all machine plantable and had little initial vegetation. However, sand dune forestry requires considerable investment in planting marram grass and lupins even before pines can be planted, and site productivity is not comparable to the Maraetai block. Also location was not favourable, being many kilometers from the nearest possible domestic market. Private companies intending to plant only pulpwood were also strict in their use of the Grainger method, despite the fact that cash flows for

pulpwood are completely different to those used by Grainger. Maori owners often accepted proposals on the basis of the highest percentage of stumpage revenue offered, without realising the big difference in their ultimate returns between pulpwood and sawlogs.

Grainger's method, viewed in terms of today's forestry practices and economic conditions, is very much outdated and as such should not be used any more in assessing potential leasehold land. The errors and confusion resulting from attempts to allow for taxation mean that all that Grainger produced was a set of percentages that appeared attractive to potential lessors. However, its aim of getting undeveloped Maori land into production forestry on a revenue sharing basis was very successful. Many thousands of hectares were signed up based on a payment derived by the use of the Grainger formula.

4.3.2. The discounted revenue method

(A) The model

The discounted revenue method uses essentially the same approach as the Grainger method, except that instead of compounding to the year when normality occurs on the whole forest (equal annual revenues and costs), this method discounts costs and revenues for a single hectare for a single rotation. A confidential personal communication provided the example presented below which is from an actual lease agreement. The agreement aims to grow pulpwood using a 21 year rotation and a 17 year planting period. Land clearing and preparation occurs in year 0, planting in year 1.

1. Revenue

Estimated forest revenue in year 22 is \$3553.05/ha. This is the value of the standing timber. Discounted for 22 years to year 0 at an 8% interest rate this is \$653.41/ha.

2. Forest development costs

<u>Project year</u>	<u>Total costs per planted hectare</u>	<u>Costs discounted to year 0 @ 8%</u>
0	\$175.84	\$175.84
1	123.13	114.01
2	6.38	5.46
3	9.56	7.59
6	108.28	68.23
9	10.87	5.44
0-21 inclusive	16.06	176.93
		<hr/>
		\$553.50

Note: all costs are incurred at the beginning of the year.

3. Land expectation value (LEV)

$$\begin{aligned}
 \text{LEV} &= \text{discounted revenue} - \text{discounted costs} \\
 &= \$653.41 - \$553.50 \\
 &= \$99.91
 \end{aligned}$$

The land expectation value of \$99.91 represents the economic surplus after invested capital has earned 8% interest, and if allocated as a return to land, becomes the residual land value at the time of clearing and preparing each hectare. The land expectation value therefore relates to the beginning of year 0 for each hectare planted.

4. Calculations of the lessor's share of stumpage

The 17 year development period is incorporated by calculating an adjusted land expectation value, which represents the present net worth of a single hectare planted in equal annual areas over a 17 year period. It is the present net worth of a cash flow of 17 annual payments each of one seventeenth of the land expectation value, occurring at the beginning of each year.

$$\text{Adjusted land expectation value} = \frac{\text{LEV}}{n} \cdot \left(\frac{(1+i)^n - 1}{i(1+i)^n} \right) \cdot (1+i)$$

where LEV = land expectation value for one rotation.

n = forest development period.

i = decimalised interest rate.

$$\text{The discounted annual payment multiplier, } \frac{(1+i)^n - 1}{i(1+i)^n}$$

assumes end of year payments, so a correction factor of $(1+i)$ is applied to give the adjusted land expectation value at the beginning of year 0.

$$\begin{aligned} \text{Adjusted land expectation value} &= \$99.91 \times 9.12164 \times 1.08 / \text{ha} \\ &= \frac{17}{17} \\ &= \$99.91 \times 0.5792 / \text{ha} \\ &= \$57.86 / \text{ha} \end{aligned}$$

As a share of discounted stumpage revenue this is

$$\frac{\$57.86}{\$653.41} \times 100 = 8.8\%$$

8.8% is the lessor's share of stumpage revenue. Its derivation is further discussed in section 4.3.2. (B).

5. Calculation of annual rent

As an alternative to a share of stumpage revenue, the lease agreement offered the lessor the option of receiving an annual rental based on the lessor's share of stumpage revenue calculated above. The lessor's expected income (discounted to year 0) is \$57.86/ha which represents 8.8% of discounted stumpage revenue. The annual cash rental in advance that this represents is calculated as follows:

(a) The lessor's expected income is reduced by a 'normal' reduction of 30% for risk not taken by the lessor during the life of the crop. If the lessor chooses to receive a guaranteed risk free annual rental, then the lessee takes the risk that the estimated forest revenue will not be realised. This reduction is further discussed in section 4.3.2. (B).

$$\$57.86 \times 0.7 = \$40.50 / \text{ha}$$

(b) The \$40.50 is then spread over 22 years (year 0 plus a 21 year rotation) as equal annual payments, which if discounted to year 0 at 8% interest are equal to the \$40.50.

$$\begin{aligned}\text{Annual rent} &= \frac{\$40.50}{10.20074} / \text{ha} \\ &= \$3.97 / \text{ha}\end{aligned}$$

* 10.20074 is the discounted annual payment multiplier for 22 years @ 8%.

Such annual rentals would be due to the lessor at the end of each year.

5. Calculation of land value

An annual rental of 6% at land value is the lessor's return from most agricultural leases. On the assumption that the annual rental of \$3.97 represents a 6% before tax on land value, land value for planted land is

$$\frac{\$3.97 \times 100}{6} = \$66.17 / \text{ha}$$

The lease area to which this example applied consisted of a plantable area of 3528 ha out of a total of 5257 ha. Land value based on gross area would be

$$\frac{\$66.17 \times 3528}{5257} = \$44.41 / \text{ha}$$

This is a residual land value based on pulpwood afforestation and bears no relation to market land values.

(B) Critical appraisal of the discounted revenue method

Although the discounted revenue model overcomes some of the problems associated with the Grainger model, others are still inherent within the method. Also, as presented, the model contains a conceptual flaw seriously affecting the results.

The discounted revenue model again relies on a predetermined interest rate and does not reflect the true productivity of land and capital. Capital is allocated an 8% return and land the residual, although the choice of interest rate was not explained in the example. The method is correct in not allowing for the effects of taxation, and thus the interest rate of 8% is a significant increase on the effective 3¼% used by Grainger. However, increasing the interest rate merely increases the return to capital, thus reducing the calculated residual (LEV) which is the basis of the lessor's share of stumpage. As with the Grainger method, the use of the discounted revenue method only results in a share of stumpage that appears attractive to the Maori land owner. The lessor's share of stumpage is very sensitive to the interest rate chosen. For example, using the discounted revenue method as outlined in the example in section 4.3.2.(A), using a 7% interest rate would have increased the lessor's share of stumpage to 16.5%, and using a 9% interest rate would have reduced it to minus 0.3%.

The main advantage of the discounted revenue method is that it can be applied to a specific lease area c.f. Grainger's average approach. By discounting estimated costs and revenues, allowances can be made for the type of product to be grown, the timing and intensity of tending, location, site productivity and rotation length. However, there is no incentive for the forest investor (lessee) to keep his estimated costs down as decreased costs only result in an increased share of stumpage revenue for the lessor. Furthermore, the more conservative the estimate of revenue, the higher the lessee's share of stumpage revenue. As the lessor's percentage share is written into the lease, there is no opportunity for the lessor to have the percentage adjusted if actual costs and revenues do not agree with the estimates used.

The conceptual flaw in the example given is in the calculation of the lessor's share of stumpage which is determined by allocating the adjusted land expectation value as a return to land and expressing it as a percentage of discounted revenue. Land expectation value was reduced by 42% to allow for a 17 year planting period, yet the discounted revenue applied to a single hectare planted straight away. Discounted revenue should be similarly adjusted as revenue also arises over a 17 year period, and not all in one year. For example, if the whole hectare had been planted straight away and no adjustment of the land expectation value was required, the lessor's share of stumpage would have been:-

$$\begin{array}{rcl} \text{Land expectation value year 0} & = & \$99.91 \\ \hline \text{Discounted revenue year 0} & & \$653.41 \\ & & = 15.3\% \end{array}$$

Instead, by adjusting only the land expectation value for a seventeen year planting period, the lessor's share was reduced to 8.8%. A 34 year planting period would have reduced the lessor's share to 5.6%. The method as used is both incorrect and inequitable and should not be used in its incorrect form.

For a 17 year development period the correct calculation should have been:-

$$\begin{array}{rcl} \text{Adjusted land expectation value} & = & \$99.91 \times 0.5792 \\ & & = \$57.86/\text{ha} \\ \text{Adjusted discounted revenue} & = & \$653.41 \times 0.5792 \\ & & = \$378.46/\text{ha} \\ \text{True equity ratio} & = & \frac{\$57.86}{\$378.46} \\ & & = 15.3\% \text{ as above.} \end{array}$$

If the discounted revenue method is used without correcting for this error, the lessor could suffer a drop in potential income as a result of a staggered planting program

designed to suit the lessee. As the percentage of stumpage revenue due to the lessor is written into the lease agreement, this is open to serious abuse. The lessor's return should be based on the land being used to its best advantage i.e. the total area planted straight away.

The annual land rent and land values, calculated as in the example, after correcting for the error in method are as follows:-

Annual land rent per planted hectare	\$6.86
Land value per planted hectare	\$114.33
Average land value (gross area)	\$76.73

In calculating the annual rent in advance in lieu of a percentage of stumpage revenue at the time of harvesting, the adjusted land expectation value was reduced by a 'normal' reduction of 30% for risk not taken by the lessor during the life of the crop i.e. the risk that the predicted revenue would not be realised. Other lease examples state that "over 30 years or more this risk is assessed at 50% of the land expectation value".

The lessor's share of stumpage revenue and the value of the annual rental he may receive as an alternative are written into the lease and fixed for the term of the lease. As a result, if the lessor chooses to receive an annual rental, he is prevented from regaining the reduction made in his expected income if the predicted revenue is in fact realised. Also he is prevented from sharing in the extra returns should actual revenue exceed predicted revenue. The lessor's income in this case is completely dependent on the estimated forest revenue.

The 30% and 50% reductions may appear large, but small changes in expected income have a large effect on land expectation value. In the example, the anticipated forest revenue in year 22 is \$3553.05/ha, which for a yield of

600 m³/ha is equivalent to a stumpage of \$5.92/m³.

Reducing the land expectation value in year 0 by 30% from \$99.91 to \$69.94 is the same as reducing the expected forest revenue in year 22 by \$162.93 (at an 8% discount rate), or reducing the stumpage to \$5.65, a drop of only 4.5%.

There is no reason why the lessor could not be offered a proportion of the rental in advance due to him and his true share calculated at the time the income is realised, the over or under payment being corrected at that time. This way the lessor still partakes of the risk and any reason to reduce his share is negated.

The annual land rent and land values, calculated as in the example, after correcting for the error in method and not reducing the lessor's expected income to allow for risk not taken, are as follows:-

Annual land rent per planted hectare	\$9.80
Land value per planted hectare	\$163.33
Average land value (gross area)	\$109.61

Although the discounted revenue method overcomes some of the problems associated with the Grainger method, it is not so easy to apply. While the concept of a percentage of stumpage revenue or an equal annual land rent is readily understood by most Maori land owners, the method should be used with care because the final result is very sensitive to minor changes in the estimated costs and revenues, and to the interest rate chosen. There is no need to maintain accurate records of costs and revenues, as once the revenue shares have been calculated, the relative equity of both partners is fixed. This cannot be regarded as being a sensible approach as it is most unlikely that the relative real equity would remain unchanged for 99 years. The method has potential if used correctly, but the relative equity still remains a reflection of the costs, revenues and interest rate chosen

rather than a reflection of the relative productivity of land and capital.

4.3.3. The internal rate of return method

(A) The model

The internal rate of return (IRR) method leaves the final apportioning of revenue until after the forest has been harvested since it is based on actual costs and revenues. The method assumes that returns should be shared between lessor and lessee in proportion to their respective inputs. The lessor's input is the land, the lessee's the costs of establishment, management and protection. The calculation after harvesting allows all inputs to earn imputed interest at the calculated internal rate of return i.e. that rate of interest which if used would result in a zero net present worth.

The IRR method has not been fully implemented because leases signed using the method have not been going long enough for a final tree crop to be produced. The example given below was taken directly from a schedule attached to a lease agreement to illustrate the method. Because the example given in the schedule was difficult to follow, it is presented here in an expanded form. The example is based on constant money values, i.e. prices can change only in real terms. However, as suggested in the schedule, a suitable money value index should be used in the actual calculation to allow for changing money value between planting and harvesting.

The lessor's share of revenue determined by the IRR method is not written into the lease agreement, but is recalculated at the end of each rotation. The following example illustrates the method for the first and second rotations. The lease agreement specified the use of "pinus radiata or other fast growing exotic trees". Forest location and site quality were not specified.

(a) First crop

Basic assumptions:-

Rotation length = 24 years. Planting occurs in year 3.

IRR was calculated to be 7%.

Stumpage revenue in year 27 = \$4269.89/ha

Initial land value as determined by the Government

Valuation Department = \$123.55/ha. This is the value of the land before any clearing or preparation is undertaken.

Table 4.5 shows the calculation of the contribution made to investment in the first crop by both lessor and lessee. The lessor's equity is calculated as follows:-

$$\begin{aligned} \text{Lessor's equity} &= \frac{\$644.17}{\$4270.82} \times \frac{100}{1} \\ &= 15.1\% \end{aligned}$$

The lessor should receive 15.1% of stumpage revenue.

The lessee's share of land value arises from 'land value' at the end of the rotation, as determined by the Government Valuation Department, including allowances for land clearing operations undertaken by the lessee not included in 'land value' as determined before forest development. Land value is explained in more detail in sections 5.1 and 5.6. Improvements remaining refer to such items as logging roads which are used for access during re-establishment.

(b) Second crop

Basic assumptions:-

Rotation length = 24 years. Planting occurs in year 27.

IRR was calculated to be 9%.

Stumpage revenue in year 54 = \$4460.16/ha

Total land value is now \$321.22/ha of which \$160.61 is the lessee's share of land value. There is no

TABLE 4.5.Contributions to Forest Investment - First Crop

(1) <u>Lessor's contribution</u>	\$ /ha compounded to year 27 @ 7%	
Land value \$123.55 for 27 years	767.72	
Less initial land value	<u>123.55</u>	
Lessor's net contribution		644.17
(2) <u>Lessee's contribution</u>		
Capital employed \$7.41 for 27 years	46.04	
Less initial capital	<u>7.41</u>	38.63
Initial roading \$118.61 for 26 years		688.81
Preparation \$177.91 for 25 years		965.59
Planting/opossum control/releasing		
\$98.84 for 24 years		501.35
Releasing \$24.71 for 23 years		117.14
Year 26 - upgrading roads for logging		
\$516.44 for 1 year		552.59
Annual costs \$14.83/ha/year for 24 years		<u>923.15</u>
		3787.26
Less lessee's share of land value plus		
value of improvements remaining		<u>160.61</u>
Lessee's net contribution		3626.65
Total contributions		<u>4270.82</u>

Notes: (i) Capital employed - this refers to capital items involved in the process of growing trees but not consumed by it e.g. lookout towers (Allison pers. comm. 1977).

(ii) Annual costs - these are compounded using the compounded annual payment multiplier which assumes end of year payments. A correction factor of $(1+i)$, where i is the decimalised interest rate, is applied to give the value of the compounded annual costs at the beginning of year 27.

reason why the lessee's and the lessor's share of land value should be the same.

Table 4.6 shows the calculation of the contribution made to investment in the second crop by both lessor and lessee. The lessor's equity is calculated as follows:-

$$\begin{aligned} \text{Lessor's equity} &= \frac{\$1109.99}{\$4435.09} \times \frac{100}{1} \\ &= 25.0\% \end{aligned}$$

The lessor should receive 25.0% of stumpage revenue.

(B) Critical appraisal of the IRR method

Unlike the Grainger and discounted revenue methods, the IRR method does not use a predetermined interest rate to allocate a calculated residual as a return to land. Instead, equity at the time of clearfelling is based on the contributions made by lessor and lessee, and revenue shared accordingly. This assumes that the lessor's input, the land, has intrinsic value in its own right, rather than a value based on the surplus economic rent as determined by a predetermined interest rate. Land valuation, its inherent problems and its applicability to afforestation leases is discussed in detail in chapter 5.

The IRR method is essentially a development of the discounted revenue method that more closely approximates true equity in a joint afforestation scheme by using actual land values, costs and revenues and an actual internal rate of return, rather than being based on estimated costs and revenues and a predetermined interest rate. The use of an internal rate of return allows the relative shares of revenue to vary from rotation to rotation depending on the value of each contributor's inputs. This is more flexible than the fixed share of stumpage derived by either the Grainger or discounted revenue methods. Similar to the discounted revenue method,

TABLE 4.6.Contributions to Forest Investment - Second Crop

(1) <u>Lessor's contribution</u>	<u>\$/ha compounded to year 51 @ 9%</u>	
Land value \$160.61 for 24 years	1270.60	
Less initial land value	<u>160.61</u>	
Lessor's net contribution		1109.99
(2) <u>Lessee's contribution</u>		
Capital employed \$7.41 for 24 years	58.62	
Less initial capital	<u>7.41</u>	51.21
Lessee's share of land value plus		
improvements \$160.61 for 24 years		1270.60
Regeneration \$61.78 for 24 years		488.75
Spacing \$24.71 for 22 years		164.53
Year 50 - upgrading roads for logging		
\$247.10 for 1 year		269.34
Annual costs \$14.83/ha/year for 24 years		<u>1241.28</u>
		3485.71
Less lessee's share of land value plus		
value of improvements remaining		<u>160.61</u>
Lessee's net contribution		3325.10
Total contributions		<u>4435.09</u>

Notes: as for table 4.5.

the IRR method is specific in that it allows for the type of product to be grown, the timing and intensity of tending, location, site productivity and rotation length.

The method does have some drawbacks in application. Firstly the share of stumpage revenue due to the lessor is not known until the trees are harvested. Secondly the method is difficult to understand by those with no economic background, and the inability to specify the lessor's share before a lease is signed is often treated with suspicion. Thirdly the method requires precise records to be kept of all expenditure associated with the leased land. Although costs such as rates, planting and pruning etc. can be readily identified, costs such as overheads and capital employed may be more diffuse, especially if the leased land is managed as part of a larger forest.

To ensure an equitable sharing of revenue is achieved the costs to be included in the IRR calculation should relate to a comparable end point i.e. the production of mature trees. Therefore only those costs associated with the production of standing timber on the leased land should be included. Thus logging costs, roading costs directly attributable to logging, and the cost of access roads to neighbouring blocks constructed through the leased land should not be included. However, as part of logging roading will serve as access roading for the next rotation, a portion of the cost of that roading will qualify for inclusion. This is a part of the lessee's improvements which are carried forward to the next rotation.

The cost of upgrading roading for logging in the year before harvesting was erroneously included in the example of the IRR calculation given in section 4.3.3.(A). This cost was part of the logging cost which is not involved in producing mature standing trees, and in which the lessor has no equity, although as noted above, a portion of these may be carried

forward to the next rotation. Similarly, the capital employed cost should only include capital involved in silvicultural operations and not logging. Inclusion of such non qualifying costs increase the lessee's equity at the expense of the lessor.

Although the lessor's input is valued by an independent agency, the Government Valuation Department, valuation of the lessee's inputs are made by the lessee. As the lessee's equity increases with increasing costs, there is little incentive for the lessee to minimise his costs or to operate efficiently. Similarly, there is a strong disincentive for the lessee to obtain the highest stumpage prices where he intends to utilise the forest produce himself. As a result, there is a need for independent control over firstly the type and level of lessee's costs to be included in the calculations, and secondly, the determination of stumpage rates. While these services could be provided by private forestry consultants, impartiality would have to be assured.

Overall, the IRR method appears to be very satisfactory provided

- (a) an acceptable basis for land valuation can be decided on, including an acceptable basis for determining the lessee's share of land value (this is discussed further in chapter 5)
- (b) agreement is reached on the types of cost which are valid for inclusion in the revenue sharing calculation
- (c) a suitable form of control can be exercised over the level of those costs
- (d) a satisfactory basis for determining stumpage is agreed upon
- (e) agreement is reached on the money value index to be used to calculate the real values over time.

Ideally, all these provisos should be considered and acceptable solutions agreed upon before a lease agreement is signed.

(C) Returns to factor inputs

In an afforestation project both land and capital cooperate to produce an economic surplus. As the IRR calculation gives the same rate of return to both factors, the share of revenue accruing to each factor depends on the individual values given to them.

In theory, the price of each factor of production in a perfectly competitive market should reflect its value of marginal product, and in the IRR calculation each factor would be equitably rewarded according to its marginal product. However, the market for land and capital is not perfectly competitive because of institutional factors which influence the prices of these inputs. In this situation, the economic returns jointly produced by two or more cooperating factors can be apportioned by Clark's theory of marginal products (Samuelson et al 1975). The difficulty in applying economic theory to practice is the determination of marginal products for land and capital in forestry. As well as being difficult to measure, the productivity of the land directly influences the growth rate of the capital or growing stock. Therefore the productivity of both factors are inseparably related.

Provided the values placed on the lessor's land and the lessee's forestry operations reflect their relative contribution to generating the economic returns, the IRR calculation will share the forest revenue in an equitable manner.

4.3.4. The N.Z. Forest Service approach to leasing Maori land

The Forest Service examines each lease proposal on the

basis of several regime options, future market options, protection values (if any), and the costs involved. From these comprehensive models are prepared and the most profitable option, compatible with protection requirements is selected. The economic model gives the percentage of stumpage revenue which the Forest Service can offer the lessor. The Forest Service compounds its costs using a 10% interest rate and also includes a percentage of direct costs for overheads. An interest rate of 10% is a minimum rate only; the Forest Service would prefer to use higher rates of return where possible (Williams pers. comm. 1977).

The internal rate of return method was examined by the Forest Service for possible use in leasing agreements (Kirkland pers. comm. 1977), but has so far been rejected for the following reasons:

(a) The method of sharing revenue has to be agreed on before the lease is signed. However, the IRR method is difficult to explain to Maori land owners who prefer to base their leasing decisions on a concrete proposal giving a definite share of stumpage.

(b) The results are unpredictable. Exact models cannot be constructed as future trends are unknown.

The unpredictability, however, is a problem with all models.

The Forest Service, therefore, continues using a 10% rate of return on its own capital, the land owner receiving the calculated residual. How the Forest Service allocates revenue in models that show very high rates of return is not known.

4.4. Risk and uncertainty - the market

4.4.1. The market

The lessor's income share depends heavily on the state of the market at the time of sale and to a lesser extent on the lessee's marketing ability. As the decision to fell lies solely with the lessee, there is scope for the lessee to gain financial advantage when marketing the forest produce. His financial gains will depend on whether the wood is to be utilised directly by the lessee or sold on the market. Where the lessee utilises the wood himself, he will gain the most by cutting timber on leased land when stumpages are low, and cutting from his own forest (if he has any) when stumpages are high. Although all leases make provisions for arbitration when disagreements arise, the lessor could be at the mercy of the lessee with regard to stumpage levels. Molloy (1978) is of the opinion that "when the lessee develops a forest for a particular end use, such as pulp, and owns the treatment facility, the operation of the usual market influences to determine timber price is difficult or impossible, with the result that the (land) owners have no way of learning whether they have been fairly treated".

The risk and uncertainty associated with marketing is greater because forestry is a long term investment. Decisions taken today affect revenue at the time of marketing. As a result the main uncertainty is the state of the market at the time of sale. The assumption is always made that a demand will exist for the products being grown. This being so, the price will depend on the strength of that demand. As New Zealand's current forest expansion program is based on a predicted world wood shortage, there is the risk that a shortage will not occur.

Some lessors are retaining a small portion of their land and establishing their own forest, under the supervision of private consultants, in order to monitor management costs and

market prices.(Liley pers. comm. 1977).

The N.Z. Forest Service's objective of "maximum financial yield" implies their marketing strategies will take advantage of any benefits that can be obtained by varying the cutting cycle. To this end Forest Service leases provide for annual consultation with lessors on the sales policy to be pursued during the following year, and the express agreement of the lessor is required before any sales can be completed. The Forest Service has honoured this agreement in the case of the Lake Taupo Forest Trust lease from which the first saleable wood was produced this year (Groome pers. comm. 1978). Such consultations are not provided for in leases held by private companies.

4.4.2. The lessee's effect on the market

In New Zealand, the Forest Service is almost the sole supplier of sawlogs for open market sales, and only three pulping companies in the North island buy pulpwood. Consequently, as both the Forest Service and the pulping companies are major holders of leased Maori land, they are in a strong position to influence market stumpage rates, especially if New Zealand remains remote from world timber markets. These aspects place the lessor's return largely under the control of the lessee.

4.4.3. Forced risk sharing

The three methods used for determining the lessor's share of stumpage revenue all force the lessor to partake of the risks and uncertainties involved in forestry, as his return depends on the price obtained and the volume of timber produced. As long as his land is physically productive, should he not receive a risk free return? Agricultural leases generally pay 6% or 7% of the land value as annual rent, and based on land values determined by current land sales and current stumpage rates, the capitalised annual land rent far exceeds the share of

stumpage based on the range of percentage share being offered in existing forestry leases. By choosing an annual land rent, the risk and uncertainty in forestry is fairly left to the lessee who has a large degree of control over eventual revenues.

However, should the Maoris be successful in their current demands for meaningful involvement in the use of their land, then they too will be liable for some of the risk and uncertainty, but in return, they should also gain some control over the management and sale of the produce.

4.5. Trends in costs and revenues

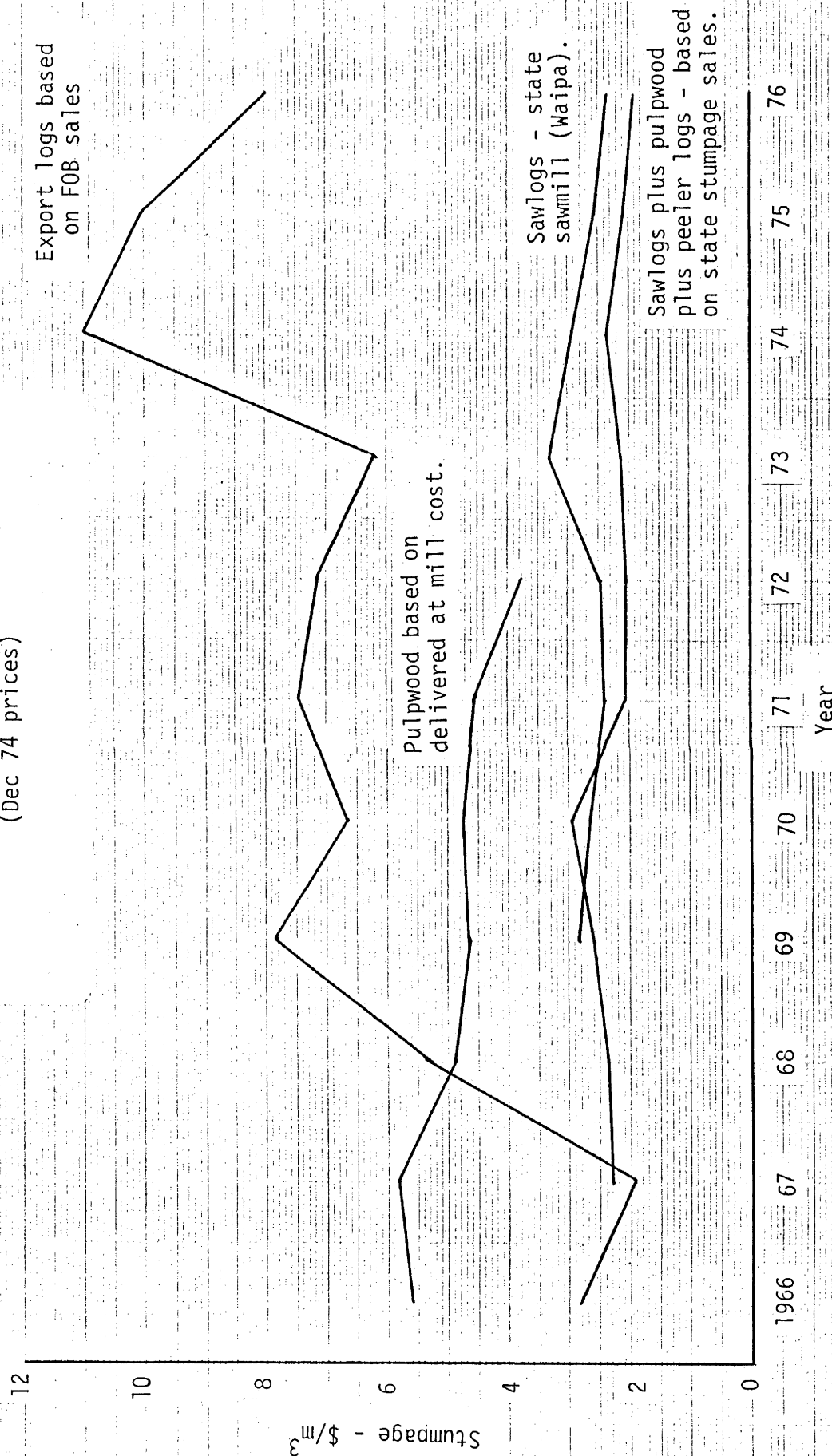
4.5.1. Stumpage trends

Specific stumpage information is difficult to obtain, most sellers and buyers preferring to keep their sales agreements confidential. The data that were available are presented in appendix 5, and the trends in real stumpages presented in figure 4.1.

The stumpage trends show a continuing divergence between stumpages for export logs and pulpwood. Although export log stumpages have fluctuated considerably, the trend has generally been an increasing one. Export log stumpages reflect world stumpage prices rather than the lower domestic stumpage price. The trend for pulpwood stumpages decreased slowly over the period for which data were available. If both these trends continue the choice of the final product giving the highest return for the lessor is obvious.

The N.Z. Forest Service stumpage sales need to be interpreted with care. While the proportion of peeler logs included in the data was extremely small, the bulk of the pulpwood sales go to Tasman Pulp and Paper Company under a long term sale agreement. Although the actual price is confidential, it is generably accepted as being extremely low,

Figure 4.1
Trends In Real Stumpages
(Dec 74 prices)



even for pulpwood. In addition, the Forest Service has on occasions sold sawlogs below their market price where special social benefits are involved. However, as the Forest Service is the major supplier of sawlogs in New Zealand its stumpage sales should indicate the trends in actual and real sawlog stumpage rates likely to be achieved by a major grower under similar conditions. Figure 4.1. shows this trend to be fairly flat i.e. actual stumpage prices have risen at the same rate as inflation.

The sawlog stumpages paid by the State sawmills to the Forest Service are based on decisions made by the Forest Service rather than open market forces. One objective of the State run sawmills has been to control sawn timber prices. Even so - real stumpage prices have remained reasonably constant between 1969 and 1976.

The conclusion that sawlog stumpages are remaining constant in real terms is supported by the Timber Price Index for radiata pine (appendix 6) which has closely followed movements in the consumer price index between 1946 to 1972.

4.5.2. Cost trends

Detailed information on the costs of forestry operations were difficult to obtain. The data which were able to be obtained are presented in appendix 7. In many cases the available data did not indicate whether overheads were included or not, neither did it indicate the inclusion or otherwise of other factors, such as an allowance for transporting labour to the site and allowance for holiday pay.

It was difficult to discern any significant trends in real costs. The real costs for some operations increased relatively little, while others decreased. Generally the rise and fall was not significant compared to the variation in real costs over the years. Although the figures suggested a small

rise in real costs over the period analysed (1962 to 1977), there was no statistical evidence to support this. As a result, it is assumed that real costs have remained constant.

4.5.3. The interaction of stumpage and cost trends

In those methods which calculate the lessor's share of stumpage as a fixed percentage over the duration of the lease, the real income accruing to both lessee and lessor will depend entirely on real stumpage trends. This implies that afforestation leases based on pulpwood crops will be subject to decreasing real returns over time, and those based on export logs would receive increasing real returns. As export log stumpages significantly exceed pulpwood stumpages, the level of income actually received by the lessor is heavily dependent on the type of product grown by the lessee.

Where the IRR method is used to calculate the lessor's share of stumpage, the trend in the real value of the lessor's land also influences the result. Table 5.7 indicates that real land values are increasing. Assuming real forestry costs remain constant, this implies that the lessor's share of revenue will increase over time.

Overall, trends for costs and returns indicate that from an investment point of view, export logs will result in the highest returns for both lessor and lessee. As some leases only specify pulpwood regimes (where the lessee makes his return from processing rather than growing wood, a part of the lessee's investment in which the lessor has no equity), the lessor is likely to receive only minimal total returns, even though his share of stumpage revenue may be relatively high.

4.6. Discussion

There is a need to deal with each Maori lease area as a separate entity rather than treating them en masse on a single formula. It is now recognised that the Maoris contribute a

productive factor to the total investment which is entitled to earn a return as a right, rather than be allocated a residual after capital invested has received a fair return. Inherent in this recognition is the need to place a value on the Maori's contribution in order that an overall rate of return may be calculated.

The IRR method most closely approximates true equity in a joint afforestation scheme. It is specific to a particular lease area in that it uses actual costs and returns, it recognises the fact that the Maori's contribution has value as a factor input, and it allows the percentage due to the lessor to vary over the duration of the lease. Although current costs, revenues and land values can be used to illustrate the method, the eventual outcome depends on the relative trends exhibited over time.

CHAPTER 5

LAND VALUATION FOR AFFORESTATION LEASES

The IRR method of sharing stumpage revenue requires that the lessor's land be valued to determine his contribution to the total investment in an afforestation lease. A valuation is not required for either the Grainger or the discounted revenue methods. This chapter examines the concept of land value and the process of land valuation which are relevant to afforestation leases.

5.1. Definitions of land value

While land valuation can be undertaken from a number of different viewpoints and purposes, there are only three methods which have any wide acceptance in practice. They are:-

- (a) Government valuation
- (b) Expectation value
- (c) Market value.

The Government Valuation Department is required by the Valuation of Land Act 1951 to value all land every five years to determine three values: capital value, land value and the value of improvements. As land is valued by local authority areas, the valuation process is continuous but an individual piece of land is valued only once every five years.

Capital value is defined by the Valuation Department as its estimate of the selling or market value of the land plus improvements. In concept the highest and best land use is used to determine capital value, though in practice the highest and best land use is generally considered to be the present use. The value of standing trees is included in capital value.

'Land value' is a new term created by the Valuation of Land Amendment Act (No. 2) 1970 to replace unimproved land value. Land value is defined to mean "the sum which the

owner's estate or interest....might be expected to realise..... if offered for sale on such reasonable terms....as a bone fide seller might.....impose, and if no improvements had been made on the said land".

The Amendment Act also re-defined improvements as work done or materials used for the benefit of the land by the expenditure of capital or labour, whose benefit is unexhausted at the time of valuation. The Act specifically lists the following which are not deemed to be improvements:-

- (a) Draining, excavation, filling or reclamation.
- (b) Grading, levelling of land or the removal of the substance of the land.
- (c) Removal, destruction or changing of the vegetation.
- (d) The alteration of soil fertility or soil structure.
- (e) The arresting or elimination of erosion or flooding.

The rationale behind the new definitions are difficult to understand, and have been the subject of numerous Court discussions (Watt and Fraser unpubl. 1978). The new definitions effectively include invisible land improvements in land value, including roads, vegetation clearing and fertilisation. This has important consequences for the IRR method of determining the lessor's share of stumpage as both lessee and lessor will contribute to land value. This is further discussed in section 5.6.

Expectation value is based on the estimated present net worth of all future incomes and costs discounted using a selected interest rate. In this approach land has no intrinsic value, but has an income generating capacity which can be realised by investing labour and capital. After satisfying the required rate of return on labour (wages) and capital (interest), the residual is a return to land. Capitalising

this return in perpetuity gives the expectation or residual value of the land. Different land uses would result in different expectation values. This is the basis of both the Grainger and discounted revenue methods of determining the lessor's share of stumpage revenue as described in chapter 4.

Market value is the price at which land changes hands. The IRR method treats the lessor's land as an 'investment' earning imputed interest. This investment character of the land provides the basis for valuation of leased land. As an alternative to leasing, Maori land owners could sell their land, the price which they would receive effectively measuring the land owner's input to the total investment. The cost to the Maori owners of retaining ownership of their land is measured by the extent to which returns from alternative investments may exceed those earned by forestry. Market land value should be used to value the lessor's input to an afforestation lease.

Rothery (1945) notes that market value is not how much the seller would like to receive or the buyer would like to pay for property, it is the price that both hypothetical buyer and seller would mutually agree upon as sound and fair. This is the basis of the willing seller/willing buyer concept used by valuers to assess the market.

5.2. The economic theory of land value.

Economic theory explains land value in terms of the land's ability to earn economic rent. Because of differences in fertility, proximity to markets, topography and climate, land varies in its ability to produce goods and services.

The term rent has multiple meanings (Clark 1973, Samuelson, Hancock and Wallace 1975), and in discussing the economic theory of land value it is useful to define economic rent and distinguish it from rent as understood by the layman. In layman's terms rent refers to the payment made by a tenant to a landlord, usually for the use of fixed improvements

as well as for the use of the land itself. Most economic texts refer to this as "rental" to distinguish it from economic rent.

The definition of economic rent is a broad one. Samuelson et. al. (1975) define it as "the amount by which proceeds actually received exceed the minimum amount which would have been necessary to evoke the supply of the various factors of production required". This rent is then allocated to the various factors including land. The capitalised economic rent attributable to land in perpetuity is the economic worth or value of the land, and in determining the economic value of land, the land is required to be used to its best economic advantage. Clark (1973) describes several methods that may be used to calculate land values based on potential productivity using both production functions and mathematical programming.

In economic theory land sells at a price because it has attributes that allow people to earn a rent or income from it, and because it is relatively scarce. Part of this income may be the utility of ownership endowed by tradition. The economic land value is the maximum sale price since it represents the maximum earning capacity of the land in perpetuity.

5.3. Market land value

Since land used for an afforestation lease is not actually sold, a market value is not readily available and a land valuer must make an estimate of what it should be. The term market value implies the existence of an active and competitive land market where the price is determined by the interaction of demand and supply. However, where transactions are few and irregular an established market price is usually not available. The latter situation is more typical in New Zealand, especially for large blocks of undeveloped land.

5.3.1. Ascertaining market land value

Three methods of ascertaining land values were outlined by O'Keefe (1974):-

(1) Comparison with similar land sold in a similar condition. Sales of this type are usually of agricultural land, although land purchases for forestry purposes have increased and have had a direct effect on market values (Watt and Fraser unpubl. 1978).

(2) Hypothetical development method. This method gives an unimproved residual land value by deducting the estimated costs of hypothetical improvements from an inferred capital value.

(3) Capitalised net rental method. This method arrives at the unimproved land value by deducting the value of existing improvements from the capitalised net rental.

Only method (1) gives a direct estimate of market value and is recommended as being the most suitable method for valuing land in a joint afforestation scheme. It is also the most reliable method, although distortions occur in the market price when agriculture is subsidised. O'Keefe claims methods (2) and (3) have serious mathematical flaws.

Cairncross (1973) and Rothery (1945) note a set of criteria which should apply in order to derive a fair market land value when land is to be sold:-

- (1) There must be a certain date.
- (2) The market must be open.
- (3) Bargaining must be voluntary.
- (4) There must be a willingness to deal.
- (5) There must be no anxiety which would cause ordinary business considerations to be overlooked.

(6) The parties must be perfectly acquainted with the land, and cognisant of all circumstances which might positively or negatively affect its value.

- (7) They must have knowledge of the current demand for land and the factors likely to affect rise and fall of price.

Where a valuation is required for leased land, the land sales used as a basis for determining the value of that land should be limited to sales which occurred under the above conditions.

5.3.2. Government influence on market land values

The New Zealand Government has exerted some control over land prices from as early as 1853 when Governor Grey fixed the price of Crown land at \$2.47/ha for good land and \$1.24/ha for poor land (Wendleken and Hannan 1974). Since that time a lot of legislation has been passed to keep down land prices and make land available to everybody. The latest of these is the Land Speculation Tax of 1973 which taxes excessive profits made from land sold after less than two years ownership.

Although these measures may have prevented land from finding its own free market value, they do not alter the concept of land value as it applies to leasing agreements, since it is the current selling price which measures the amount of money the land owner is contributing to the joint afforestation project and which he cannot use on other investment opportunities.

5.3.3. Valuing leasehold land for forestry in practice

Generally the Government Valuation Department's valuation is used as a measure of the value of the lessor's input to an afforestation lease. Although the Department does base its valuations on consideration of sales of land in a similar condition, and therefore should reflect current market prices, in practice the Government valuation is usually regarded as a minimum value when land is sold. As well as the five yearly revaluation of land required by law, the Valuation Department will provide valuations on request, should a more recent valuation be required.

Government valuations are generally used because they are completely impartial and readily available.

5.3.4. The market value of forestry land

Table 5.1. shows the average prices that have been paid for land for afforestation purposes in recent years. Forestry land sales were not recorded separately by the Valuation Department until 1970.

TABLE 5.1.

Land Values In New Zealand - Forestry Land

<u>Year</u>	<u>Number of sales</u>	<u>Average price (\$/ha)</u>	<u>Average price (\$/ha Dec. '74 values)</u>
1970	54	50	74
71	58	35	47
72	53	37	47
73	81	77	90
74	91	178	187
75	60	195	178
76	69	165	129

Source: Valuation Department N.Z.

C.P.I. - appendix 6.

5.4. The demand and supply of Maori land for forestry leases

Since only a small number of Maori land blocks have been leased for afforestation to date, the returns being offered to the land owner are unlikely to be a realistic measure of demand and supply forces. However, with increasing interest in the leasing of Maori land for forestry by both potential lessee's and the Maori land owner's themselves, competition for lease areas is likely to increase, and returns offered to land owners will increasingly reflect the interaction of demand and supply. Future demand and supply are examined in the following section.

5.4.1. Demand

The demand for Maori land for afforestation will depend on the expansion rates proposed for the national exotic forest estate which have been discussed in section 2.3.

The planned expansion rate for the exotic forest estate is at least 44,000 ha per annum. Although only part of this will take place on Maori land in any one year, many of the remaining large blocks of undeveloped land belong to Maori owners, and the demand for such land is likely to be fairly strong.

A N.Z. Forest Service survey of undeveloped and under-developed land (O'Neil 1974), irrespective of tenure, showed that at the maximum planting rate suggested by the 1974 Forestry Development Conference, of 55,000 ha per annum, there was enough land suitable for forestry development to sustain the planting program well beyond 1984. Since forestry is more profitable than agriculture on certain land types, Thomson (1974) expects that the Forest Service will be allocated a generous portion of the as yet uncommitted Crown land free of charge. However, the Forest Service is keen to develop Maori land for social as well as economic reasons and will generally give preference to Maori land. This also means the Forest Service will have Crown land available at a later date.

The demand for Maori leasehold land from private companies is likely to be greater than that indicated by the demand for forestry land in general. Leasing based on revenue sharing agreements allows a faster rate of expansion to be financed from the same amount of capital than would occur on land that has to be purchased outright.

Bunn (1974) considers that agricultural prices for land will determine the location of much of the exotic forest estate in the 1980's. However, the early part of any

expansion is likely to be determined by the location of leasable Maori land blocks because of the economic advantages they confer. Once all the available Maori land blocks have been leased, attention may then turn to under-developed and marginal agricultural land.

To date no Maori land block offered has failed to find a leasee. It is very likely that a significant proportion of new plantings in the next ten years will take place on Maori land.

5.4.2. Supply

Maori land represents 5.9% of New Zealand's land surface. The 1965 Committee of Enquiry into Laws Affecting Maori land and the Powers of the Maori Land Court noted that in the North Island there were approximately 479,000 ha of unoccupied Maori land. Of this, the Committee considered that 43% was "unsuitable for development", 34% "suitable for forestry" and the remaining 23% "probably of no use". "Suitable for development" meant suitable for agriculture, so the area which could be afforested would be approximately 370,000 ha. By the end of 1977 about 104,800 ha of Maori land had been leased leaving about 265,200 ha still available for afforestation leasing, assuming none has been developed for agricultural purposes. This represents five years planting at the maximum national target rates of 55,000 ha per annum, and if planted in those five years, Maori leasehold land would represent about 46% of the total exotic forest estate by 1982. The potential importance of Maori land to forestry is clearly indicated. As the bulk of Maori land (94%) is located in the North Island, the South Island will not contribute significantly to the total area of Maori land likely to be afforested under a lease system.

The supply of Maori land for forestry generally depends on land owners approaching an afforestation concern to indicate that the land is available and that they are

interested in an afforestation project. With some blocks already leased and successfully put into production, there is evidence to other Maori land owners that afforestation is a tangible option. As a result increasing numbers of owners have come forward to indicate their willingness to lease their land for afforestation purposes. One Company alone, Winstone Afforestation Ltd., reported that in late 1977 it was negotiating a further five leases with a combined area of 16,000 ha (Mercer pers. comm. 1977).

5.5. Forestry versus agriculture - profitability and land prices

Prices for rural land have usually been determined by agricultural values. The economic fortunes of agriculture are thus a prime determinant of rural land prices on the open market, though there are an increasing number of sales of land for forestry purposes (Watt and Fraser unpubl. 1978). While land values based on returns to agriculture may not be a fair measure of their value for afforestation, the returns from forestry have been at least equal to, if not greater than agriculture. Consequently, the use of rural land values determined by agricultural considerations is a valid basis for valuing forestry land. If agriculture is more profitable, then in those leasing agreements where the land is suitable for agriculture, the agricultural value of the land should be used, as this represents the amount of money the land owner has invested in the lease.

5.5.1. A comparison of the net earnings from forestry and agriculture

The net earnings that can be achieved by a particular land use will determine the value of the land. Extensive specific data on net earnings per unit area were not available for either forestry or agriculture, and tables 5.2. and 5.3. can only suggest what they might be.

The net returns for agriculture are based on extensive grazing i.e. the type of agricultural land use most likely to compete with forestry. As most Maori land is in the North Island, the returns for grazing are presented for the North Island only. To avoid the problem of choosing a specific interest rate for forestry, the results of using several rates are presented.

TABLE 5.2.

Net Annual Income From Forestry
(\$/ha Dec. '74 values)

Product grown	Rate of Interest				
	6%	8%	10%	12%	14%
Export logs	99.6	75.6	56.3	41.1	29.1
Sawlogs	62.9	47.2	34.5	24.5	16.6
Pulpwood	23.4	17.0	11.8	7.5	4.1

Source: appendix 8.

TABLE 5.3.

Average Net Annual Income From Grazing - North Island
(\$/ha Dec. '74 values)

<u>Year</u>	<u>Average net annual income</u>
1970	14.06
71	17.03
72	21.43
73	50.60
74	30.94
75	8.94
Mean	\$23.83

Source : appendix 8.

Tables 5.2. and 5.3. indicate that the net returns from forestry compare favourably with those from grazing. Returns from forestry for export logs exceed returns from grazing by a substantial margin, but pulpwood earnings are only equal to earnings from grazing at the lowest interest rate shown. Consequently, the use of agricultural land values as a basis for valuing land for forestry is acceptable.

Information supporting this conclusion is presented in appendix 9 where the rates of return on investment in forestry and agriculture are compared. The comparison indicates that the rate of return from forestry is at least equal to, if not greater than the rate of return from agriculture.

5.5.2. A recent land use study

A recent land use study comparing forestry and pastoral development on the same piece of land (Anon 1977d), gave the net present worths shown in table 5.4. using a 10% interest rate.

TABLE 5.4.

Net Present Worths for Alternative Land Uses

	<u>Pulp project</u>	<u>Develop existing pasture</u>	<u>Develop Scrubland for pasture</u>
Net present worth (\$/ha)	348	421	134
Area involved (ha)	15,300	13,600	1,700

The pulp project would involve afforestation of both pasture and scrubland. Despite the fact that the weighted net present worth for developing both existing pasture and scrubland for agriculture (\$389/ha) exceeds the net present worth for forestry, the study concluded that "forestry can compete for farmland and scrubland with development potential,

although the results are sensitive to F.O.B. pulp prices and start up time for the mill". The results of further study on the alternatives for farmers are shown in table 5.5.

If the percentage of logs shown in the right hand column of table 5.5 can be exported, forestry and farming will have the same net present worth and land values will be similar. If 100% of logs were exported, forestry would be the most economically productive land use on all categories of land. Based on domestic log prices, agricultural development is more productive, except in the case of forest farming on scrub or cutover bush.

The fact that forestry is shown to have a higher net present worth than pastoral development for land not already partially developed for pasture, i.e. scrubland and cutover bush, again indicates that using agricultural land values as a basis for valuing land for forestry is valid.

5.5.3. Discussion and free market land values

Since the net annual income for both forestry and grazing are not significantly different, and the net present worth of developing undeveloped land for forestry exceeds that for pastoral development, the prices paid for grazing land can be used as a basis for valuing land for forestry. This means that ascertaining land values for forestry leases can be based on sales of comparable land sold either for forestry or grazing purposes.

Table 5.6. shows actual free market prices paid for forestry and grazing land. The grazing land values are based on the sales of whole farm units and do not include grazing land sold as small parts of farms of other categories.

TABLE 5.5.Alternative Land Uses Facing Farmers

	Net present worth @ 10%	Calculated log exports required to break even with pastoral <u>development</u>
Agricultural development		
- pasture	421	
- scrubland	134	
- cutover bush	75	
Forest farming		
Domestic log prices	332	24%
Export log prices	703	
Woodlot forestry - on farmland		
Domestic log prices	8	52%
Export log prices	814	
Woodlot forestry - on scrubland		
Domestic log prices	-58	26%
Export log prices	675	
Woodlot forestry - on cutover bush		
Domestic log prices	-179	35%
Export log prices	553	

Source: King Country Land Use Study - Stage 1
Report Dept. of Land and Survey

TABLE 5.6.

Free Market Land Values
 (\$/ha current prices)

<u>Year</u>	<u>Forestry Land</u>	<u>Grazing Land</u>
1970	50	114
71	35	158
72	37	124
73	77	131
74	178	206
75	195	171
76	165	225

Source :- Valuation Department. N.Z.

Table 5.6. shows how the free market price paid for forestry land has increased substantially and is now comparable with agricultural land values. The table further justifies the use of agricultural land values for assessing the land owner's contribution to afforestation leases.

Likely reasons why prices for forestry land have not exceeded prices for grazing land to a greater degree, despite the fact that the net annual returns from forestry generally exceed the net annual return for grazing, are that investors may not be aware of the higher returns from forestry, and that they may be reluctant to invest in forestry because of its long term nature.

5.6. Land values and land clearing costs

In an afforestation project, the clearing of existing vegetation is usually a major cost. The existing vegetation has a depressing effect on the value of the land and the sale price for the same piece of land in a cleared state would be correspondingly higher. Before 1970, the definition of improvements in the Valuation of Land Act 1951, was such that vegetation clearing or alteration was included as a legitimate improvement which was treated separately from the value of the land. This was consistent with the general approach to determining land expectation values and internal rates of return for forestry, as land preparation costs were considered an integral part of the cost of growing the first crop of trees.

The valuation of Land Amendment Act (No 2) 1970 modified the definition of improvements, and vegetation clearing and alteration are no longer considered to be improvements. Strict application of the new definition leads to all site preparation costs being classified as part of land value. This has important implications for leasing in that the value of land clearing accrues to the land rather than to the forest, and as a result, land clearing by the lessee will have a direct effect on land value. However, as part of the benefit of land clearing will accrue to the forest, the increase in land value will only be part of the cost of land clearing.

To the extent that the increase in land value has been bought about by expenditure by the lessee, when using the IRR method to share revenue between lessor and lessee, it would

not be equitable for the increase in land value to be credited to the lessor. As noted by Allison (pers. comm. 1977), this would have the effect of the lessee paying rent to the lessor on expenditure incurred by the lessee. This problem does not arise when using the Grainger or discounted revenue method to share revenue, as when using these methods the value of the land does not have to be specifically quantified to be used in a formula, but is negotiated implicitly.

Legally the lessee has no equity in the value of the land, and should the lease be terminated, any increase in land value that has arisen because of expenditure on land clearing by the lessee will accrue directly to the land owner.

Prior to the redefinition of improvements, when using the IRR method to share revenue between lessor and lessee, all of the land clearing cost would have been charged as a cost of growing the first crop of trees. However, this was also not strictly correct, as it cannot be said that the benefits of the lessee's land clearing operations are exhausted at the end of the first rotation. Some of the benefit still applies to the second and subsequent rotations, a contribution for which the lessee would have received no credit. The lessee was credited with a share of land value in the second rotation in the example of the IRR method shown in section 4.3.3. (A) in order to give him credit for the contribution initial land clearing makes to the second and subsequent rotations.

The redefinition of improvements has created considerable confusion and a strong source of potential disagreement in that there is no exact basis for allocating the lessee a share of land value, nor is there an exact basis for deciding what portion of this share should be carried forward as a measure of the benefit initial land clearing makes to subsequent rotations. Where the IRR method is used to share revenue, agreement on the method to be used to determine the lessee's share of land value is essential before the lease is signed.

Existing leases based on the use of the IRR method have left such decisions to the time when the first revenue is to be shared, and as the magnitude of the lessee's share of land value directly affects the lessor's share of stumpage revenue, there is likely to be considerable disagreement.

A more simple equitable solution to this problem would be for the lessor to compensate the lessee for the increase in land value that results directly from the lessee's land clearing operations. A valuation of the land before and after land clearing by the Government Valuation Department would give an impartial assessment of the increase in land value. The total land value would then belong to the lessor, and the contribution initial land clearing makes to the second and subsequent rotations, which form part of land value, would then form part of the lessor's contribution to the afforestation project. As a result there would be no need to apportion the value of the land between lessor and lessee. The lessee could charge that portion of land clearing costs for which he had not been compensated by the lessor, as a cost of growing the first crop of trees.

5.7. Increases in real land values

In the example of the IRR method shown in section 4.3.3.(A), land was ascribed an initial value which was maintained throughout the rotation. Because the IRR method measures the relative contributions made by the lessor and lessee to the lease, and shares revenue accordingly, changes in real land values must be included. The contribution the land owner makes to the lease over a single rotation period is the average value of the land over that period, not the value of the land at the beginning of the rotation, and in order to credit the land owner with changes in the real value of his land, a periodic revaluation is required. Failure to allow for increasing real land value would result in the lessor receiving credit for only a portion of the real value of the

land in the latter years of the rotation. Conversely, if land were to decrease in real value, the lessor would receive credit for an inflated land value. Table 5.7. shows the trend for rural land values.

TABLE 5.7.

Trends In Real Rural Land Values

<u>Year</u>	<u>Number of properties sold</u>	<u>Average price (\$/ha)</u>	<u>Average price (\$/ha Dec, '74 values)</u>	<u>Change from previous year (%)</u>
1965	8642	243.5	460.3	
66	9281	293.7	540.9	+17.5
67	8914	285.7	496.0	- 8.3
68	7566	313.1	521.0	+ 5.0
69	7329	279.6	443.1	-15.0
70	8480	320.7	477.2	+ 7.7
71	9080	326.0	439.4	- 7.9
72	9106	369.6	466.1	+ 6.1
73	10,760	420.3	489.9	+ 5.1
74	14,494	524.9	550.8	+12.4
75	11,173	713.4	652.7	+18.5

Compound rate of increase for 10 year period
in real terms = 3.6%.

Increase in real land value over a 25 year
rotation = 242%.

Note: This table includes all freehold rural properties
transferred under the Land Transfers Act.

Source: N.Z. Official Yearbook 1976 (Anon 1976a).
C.P.I. - Appendix 6.

However, as noted by Allison (unpubl. 1975), if the lessor's contribution to the lease is revalued periodically, then so should the lessee's. Because the lessee's expenditure is staggered throughout the rotation, and the lessee's contribution to the lease is taken as the cost at the time it is incurred (after allowing for changing money value), the lessee's contributions will already have had the benefit of a period of change in real costs. However, if the lessor's contribution is revalued after the lessee has incurred a particular cost, then the contribution that cost makes to the total investment should also be revalued.

As land values are increasing at 3.6% per annum in real terms, and the real cost of forestry operations is remaining constant (see section 4.5.2.), by not allowing for changes in real costs and values, the lessor's contribution to the lease, and his share of stumpage revenue, are considerably understated.

In practical terms, as the IRR calculation is not undertaken until all the costs and returns are known, changes in real costs and land values are easily included.

5.8. Discussion

Where the IRR method is used to share revenue between lessor and lessee, there are many aspects of land value and land valuation that need to be carefully considered by both parties, and the long term effect spelt out so each side has a clear understanding of all the implications. This applies especially to an understanding of the term land value as determined by the Valuation Department, and how the lessee can fairly claim a share in land value, a situation which will undoubtedly be treated with suspicion by potential lessors.

To avoid contention at a later date, the process and

basis of land valuation, as it applies to afforestation leases, must be clearly defined before a lease is signed.

CHAPTER 6.

THE EFFECTS OF TAXATION

The effects of taxation are important in a joint afforestation lease in that it affects the returns of the lessor and lessee through both income tax and forestry tax incentives. From a taxation point of view there are three groups involved in leasing Maori land for afforestation; the N.Z. Forest Service, the private forestry companies and the Maori land owners, and each group is subject to different tax considerations. A detailed treatise on all aspects of forest taxation in New Zealand is presented by Roper and Fraser (unpubl. 1978).

6.1. The N.Z. Forest Service

As a Government Department, the N.Z. Forest Service pays no tax and can claim no tax incentives. The Forest Service's share of stumpage revenue from an afforestation lease is credited to the Government's consolidated revenue account.

If the Forest Service were to use the IRR method to share revenue, then the actual forestry costs incurred are the true net cost contribution the Forest Service makes to the total forest investment.

6.2. Income tax

6.2.1. Private companies

Private companies in New Zealand are taxed at 45 cents in the dollar for every dollar of assessable income, assessable income being gross income less expenses which are deductible for income tax purposes (Anon pers. comm. 1978c).

In commercial forestry no deduction can be made for expenditure until income is derived from the sale of timber. Until the mature timber is disposed of (say 20 to 25 years

for sawlogs), all costs of planting, maintenance and development incurred by the company must be capitalised to a 'cost of bush' account. The cost of bush account does not attract interest. It is only when income is eventually derived from the mature forest that the cost of bush account can be deducted for tax purposes.

6.2.2. Maori land owners

Maori land invested in an afforestation lease is generally administered by a trust or a committee representing the owners (see appendix I). For tax purposes, any person or body of persons administering land for Maoris are deemed to be Maori Authorities, which are divided into two classes; those with more than twenty beneficiaries, and those with twenty or less (Anon pers. comm. 1978c). The reason for the distinction is that if the number of Maoris is substantial, each individual has very little, if any, control over the assets and operations carried out by the authority. However, if the number is small the position is analogous to a partnership with each individual in a position to exercise some control.

Authorities with more than twenty beneficiaries are liable to tax at the rate of 7.5 cents in the dollar on their taxable income and a further 12.5 cents in the dollar on undistributed income. The distributed income is treated as dividend income in the hands of shareholders, and is subject to personal income tax.

Authorities with twenty or less beneficiaries act as agents for the shareholders who pay tax on their share of income based on personal income tax tables whether the income is distributed or not.

If a Maori authority receives income from timber sales or timber royalties, only a certain proportion of income is assessable for income tax purposes. If the income is derived from indigenous timber only one sixth the income is assessable; if the income is derived from exotic timber only one half the income is assessable. These special conditions apply only to Maori authorities.

Generally in a joint afforestation lease there are three methods available for giving the lessor a return for the use of the land:-

- (a) A deferred rental as a lump sum at the time the forest is harvested.
- (b) Advances on the deferred rental on an annual or periodic basis. These payments are taxable in the year in which they are received (Anon pers. comm. 1978c).
- (c) An annual land rent based on land value. This is independent of stumpage revenue. As an annual land rent is not 'income from timber sales or timber royalties', the tax concessions described above do not apply if the lessor chooses to receive his return as land rent.

The method of payment, the tax laws and the type of Maori authority all interact to determine the disposable income accruing to the lessor.

6.3. Tax incentives

As an incentive to promote investment in forestry by the private sector, the 1965 budget introduced a special tax concession allowing forestry companies to deduct certain costs from income derived from forestry or other sources, in the same year. Expenditure deducted on this basis can produce a loss which can be carried forward to subsequent years.

Expenses which can be claimed are:-

- (a) Costs incurred in planting or maintaining trees or in preparing or otherwise

developing the land for forestry.

- (b) Rents, rates, land tax, insurance premiums or other like expenses.
- (e) Interest on borrowed money.

The net effect of this concession is a reduction of assessable income resulting in immediate assistance to the forest grower.

For smaller companies and individuals, who do not have current income from forestry or other sources, there is a similar incentive to invest in forestry in the Forest Encouragement Grant scheme (Anon 1977f), which provides for a cash grant of 50% of all qualifying costs as listed above, providing the total expenditure on forestry projects does not exceed \$300,000 per annum. Forestry Encouragement Grants are not granted automatically, but are subject to approval by the N.Z. Forest Service. In considering an application for a grant, the Forest Service will take into account whether:-

- (a) the project is in the national interest.
- (b) the project is technically and economically feasible.
- (c) the applicant's financial position is adequate to enable him to complete the project.
- (c) the applicant has, or has access to, acceptable forestry knowledge and expertise.

Grant approval is generally for a maximum of 10 years consecutive planting, and the maximum claim on any one hectare is \$450.

Forestry expenditure which cannot be claimed against other income, or is not eligible for a 50% grant, can be carried forward under the cost of bush formula and charged against income from the sale of timber when the forest is harvested.

The effect of the tax concession/Forestry Encouragement Grant on leasing is in determining the lessor's share of stumpage. Lessees able to claim forest expenditure against current income, or able to claim a 50% grant, only pay the remaining 55% or 50%(whichever is applicable) of the cost involved. The remainder is available for investment elsewhere, and the actual costs of forestry operations do not reflect the true cost to the lessee. Table 6.1 shows the revenue sharing calculation presented as an example of the IRR method for the first rotation in section 4.3.3.(A), after allowing the lessor to claim all his forest costs against current income i.e. all the lessee's expenses have been reduced by 45%. Basic assumptions are:

Rotation length = 24 years. Planting occurs in year 3.

IRR was calculated to be 9.4%.

Stumpage revenue in year 27 = \$4269.89.

Initial land value = \$123.55/ha.

The lessor's equity is calculated as follows:-

$$\begin{aligned} \text{Lessor's equity} &= \frac{\$1273.80}{\$4306.31} \times \frac{100}{1} \\ &= 29.6\% \end{aligned}$$

The lessor should receive 29.6% of stumpage revenue.

The tax concession nearly doubles the percentage of stumpage revenue due to the lessor from the 15.1% given in section 4.3.3. (A) to the 29.6% given in table 6.1. Where the lessor was eligible for a Forestry Encouragement Grant the return to the lessor would be even greater when only the net cost of the lessee's operations were included in the IRR formula.

Regardless of the method used to share revenue, if the lessor is granted a Forestry Encouragement Grant or can claim all his forestry costs against a current income, the New Zealand taxpayer subsidises the lessee's forestry expenditure

TABLE 6.1.

Contributions to Forest Investment - After Tax

(1) <u>Lessor's contribution</u>	\$/ha compounded to year 27 @ 9.4%	
Land value \$123.55 for 27 years	1379.36	
Less initial land value	<u>123.55</u>	
Lessor's net contribution		1273.80
(2) <u>Lessee's contribution</u>		
Capital employed \$4.08 for 27 years	46.15	
Less initial capital	4.08	42.07
Initial roading \$65.23 for 26 years		674.37
Preparation \$97.85 for 25 years		924.68
Planting/opossum control/releasing \$54.36 for 24 years		469.56
Releasing \$13.59 for 23 years		107.30
Year 26 - upgrading roads for logging \$284.00 for 1 year		310.74
Annual costs \$8.15/ha/year for 24 years		<u>664.40</u>
		3193.12
Less lessee's share of land value plus value of improvements remaining		<u>160.61</u>
Lessee's net contribution		3032.51
Total contributions		<u>\$4306.31</u>

and revenue share by either 45% or 50% and consequently makes a substantial investment in the afforestation project. However, the taxpayer has no direct claim to his contributed 'share' of stumpage at the time the trees are sold; this goes entirely to the lessee.

The special concession and grant were originally introduced as an incentive to increase private sector investment in forestry. Where the forest grower is also the owner of the land, all the benefits justifiably accrue to him. Because the incentives were limited to a tax rebate or grant on forest establishment and operating costs, in a joint afforestation lease, the lessor can only benefit indirectly by negotiating a higher annual rental. Because of the limited number of large organisations involved in afforestation in New Zealand, the lessor is generally in a poor position to capture the full amount of the increase in economic rent which could be attributed to these incentives.

6.4. Export incentives

Various tax concessions exist as an incentive for increased exports. However, the concessions only apply to goods which have had some degree of domestic processing.

Export logs do not qualify. As the lessor has no equity in processing the timber produced on his land, he can only benefit indirectly by negotiating a higher annual rental for the land and, as noted earlier, he is generally in a poor negotiating position to capture the full amount of the increase in economic rent involved.

CHAPTER 7.

COMPARISON OF REVENUE SHARING AND ANNUAL RENT

Although revenue sharing is the basis of most of the currently existing lease agreements, the option of receiving an annual land rent based on land value still exists. N.Z. Forest Service offer an annual rental scheme as an alternative to revenue sharing (Kirkland pers. comm. 1977), and an information booklet prepared for potential lessors by N.Z. Forest Products Ltd states that that company is also prepared to offer an annual rental scheme. The method of payment selected by the lessor is written into the lease and cannot be changed during the term of the lease, unless by mutual agreement with the lessee.

Current feelings among Maori lessors is that revenue sharing offers them better prospects, although in many cases Maori owners are also demanding some current returns, either as revenue paid in advance or as land rent. For this reason it has been suggested that leases could use both methods of payment (Anon unpubl. 1976a).

7.1. The advantages and disadvantages of annual rent

Annual land rent is usually expressed as a percentage of land value as assessed by the Government Valuation Department. In agricultural leases rent is generally 6 to 7% of land value, and the N.Z. Forest Service offers a similar percentage if no revenue sharing is involved (Williams pers. comm. 1977).

The advantages of an annual rent are:-

(a) The lessor is completely aware of the basis of his income from the lease.

(b) The basis of the lessor's return is independently assessed by the Government Valuation Department.

(c) The lessor is not subject to all the risks and uncertainties of investment in forestry.

(d) The lessor's return is not subject to the actions and decisions of the lessee i.e. rate of planning, product to be grown, marketing strategy and ability.

(e) The lessor enjoys increased returns if the land value increases.

(f) The lessor receives an annual income rather than a lump sum at the end of each rotation.

(g) An annual land rent avoids complicated lease documents.

(h) An annual land rent avoids many areas of potential conflict between lessor and lessee.

(i) There is an incentive for the lessee to utilise cost control and operate as efficiently as possible.

(j) An annual land rent avoids the need to keep accurate records of all forest expenditure by the lessee which would be required if the IRR method was used to share revenue.

The disadvantages of an annual rent are:-

(a) The lessor does not have the opportunity to share in potentially high returns from log exports. However, future trends are probably towards increased domestic processing.

(b) As land rent is not 'income derived from the sale of timber', there is no 50% reduction allowed in the lessor's taxable income derived from the lease.

(c) The lessor has no case for meaningful involvement in the use of his land as he has no equity in the forest being grown. This is beginning to concern land owners and they are demanding an increased say in the use of the land.

7.2. The advantages and disadvantages of revenue sharing

The leasing of land for forestry based on revenue sharing

methods was originally instigated to avoid the large initial cost of buying land. However, rather than receive their return from an afforestation lease at the time the trees are harvested, Maori land owners are increasingly pressing for intermediate returns. The willingness of lessee's to comply with these demands would suggest that avoiding early expenditure on land purchases is not as important as it may have been, although paying intermediate returns to the lessor is still less costly than the outright purchase of land.

Of the three methods used to share revenue discussed in chapter 4, the IRR method gives the most equitable sharing of revenue. Most advantages and disadvantages of revenue sharing apply regardless of the method used.

The advantages of revenue sharing are:-

1. All methods.

(a) The lessor has the possibility of sharing in possible future increases in stumpage values.

(b) The lessor is able to claim a 50% reduction of his income derived from the lease, assessable for tax purposes.

(c) As the lessor has equity in the forest, he is more involved with the entire project on his land. This equity also provides a basis for demanding lessor participation in forest management.

2. Advantages that only apply to the IRR method.

(a) Both lessee and lessor earn equal rates of return on their respective investment in the joint project.

3. Advantages that only apply to the Grainger and discounted revenue methods.

(a) The lessor's share of stumpage revenue is set before the lease is signed.

The disadvantages of revenue sharing are:-

1. All methods.

(a) The lessor is subject to all the risks

and uncertainties involved in forestry, including the management and marketing abilities of the lessee.

(b) The lessor's returns are subject to the actions and decisions of the lessee.

(c) Unless special arrangements are made, the lessor has to wait at least to the end of the first rotation before he receives any substantial returns.

(d) Revenue sharing is more expensive to administer than an annual rental scheme.

(e) The possibility of disagreement is much greater with revenue sharing than with an annual rental lease as the lessee's obligations and intentions have to be clearly stated in writing.

2. Disadvantages that only apply to the IRR method.

(a) The IRR method of sharing revenue is complex and difficult to understand, yet the method has to be fully explained to and understood by the lessor.

(b) The share of stumpage revenue receivable by the lessor is unknown until the trees are clearfelled.

(c) Accurate records of all the lessee's expenditure must be kept.

(d) As the costs incurred by the lessee directly increase his share of revenue, there is no incentive for him to keep down his costs and operate efficiently.

7.3. Combined annual land rent and revenue sharing

It is possible to obtain the best of both systems by paying the lessor a reduced annual rent and giving him a smaller share of the actual stumpage revenues at clearfelling. This combined approach would be relatively simple to implement. The lessor, for example, could be paid an annual rental on half his land, and enter into a revenue sharing lease on the remainder. Alternatively, he could receive half the annual rent for his total land area, plus half the revenue he would have received without rental payments, the end result being the same. One such lease already exists.

In the Paehinahina Mourea lease, the lessor receives $4\frac{1}{2}\%$ of land value as an annual rent, and 4% of stumpage revenue (Groome pers. comm. 1978).

7.4. Comparison of alternatives

Land rent and revenue sharing lease agreements have been compared by examining the stumpage required to equate the lessor's returns with an annual rental based on 6% of market land value. Results are presented for a range of percentage shares of revenue due to the lessor, and to avoid the problem of choosing an interest rate, the results of using several different rates of interest are shown. Basic assumptions made for the comparison are:-

Market land value is \$150/ha (Dec 74 values).

Merchantable yield is 576 m³/ha (Fenton and Tustin 1972).

Rotation length is 22 years.

Stumpages (Dec 74 values):-

Export logs	\$9.00/m ³
Sawlogs	\$6.00/m ³
Pulpwood	\$2.50/m ³

Table 7.1 shows the value of the compounded annual land rent of 6% of land value in year 22. Table 7.2 shows the stumpages that would have to be received from the sale of forest produce to equate the lessor's share of revenue with the income he would have received from an annual rent.

Table 7.1. does not include real changes in land values which are increasing at approximately 3.6% per annum (see table 5.7). Also changes in real stumpage prices are ignored. Assuming land values and stumpages remain constant in real terms, table 7.2. indicates that over the range of values examined it was more profitable for the lessor to accept an annual rent (based on 6% of land value) than to receive his income as a share of pulpwood stumpages. Annual rent

TABLE 7.1.

Annual Land Rent Compounded to Year 22
(\$/ha)

	Interest Rate				
	8%	10%	12%	14%	16%
6% of \$150 per annum compounded to year 22	499.11	642.62	832.52	1083.92	1416.96

TABLE 7.2.

Stumpages Required To Equate Lessor's
Income With Annual Land Rent
(\$/m³)

Lessor's share of stumpage revenue	Interest Rate				
	8%	10%	12%	14%	16%
10%	8.67	11.16	14.45	18.82	24.60
15%	5.78	7.44	9.64	12.55	16.40
20%	4.33	5.58	7.23	9.41	12.30
25%	3.47	4.46	5.78	7.53	9.84

Note: if a mixture of products was grown, the above stumpages would refer to the weighted average stumpage required.

was also more profitable than a share of revenue based on domestic sawlog stumpages except when the rate of interest was low and the share of revenue was high. The share of

revenue based on export stumpages was, however, more profitable than an annual rental except when interest rates were high and the revenue share was low. Since interest rates for mortgage finance vary between 12-14% per annum (Young pers. comm. 1978), the lessor would be better off by accepting an annual land rent unless export logs are to be grown. Leases based on a share of revenue from growing pulpwood gave the lowest returns of the options examined.

Since land values are increasing in real terms and pulpwood stumpages are decreasing, there is a strong case against the lessor opting for a share of revenue from pulpwood regimes. Because real domestic sawlog stumpages are remaining constant, a share of domestic sawlog revenue will also become less favourable to the lessor as land values increase. The comparative profitability of sharing revenue from export log production will depend on the rate of increase in real export log stumpages. If the increases in the real value of export stumpages fail to keep up with increases in real land values, then an annual rent will become increasingly attractive; alternatively the converse could apply, especially if compound interest rates are low and the lessor is to receive a high share of export log stumpage revenue.

Log exports are expected to decrease in importance over time with the bulk of the logs produced being processed domestically (see section 2.3.2.). Therefore domestic rather than export stumpages will be more relevant when examining alternative leasing agreements. Consequently annual land rent is likely to be the best financial option available to the lessor.

Table 7.2 simplifies the real situation and can only be regarded as a rough indicator, especially as the comparison of alternatives has not taken into account the effects of taxation discussed in chapter 6. Unfortunately it was not

possible to examine the combined effects of stumpage rate, share of revenue, interest rate, rotation length, tax rate and method of receiving income because of the limited time period available for this study.

7.5. Combined forestry and grazing leases

With increasing interest in New Zealand in combining growing trees and grazing, it was inevitable that farm-forestry should be suggested for leased land. However, to the writers knowledge only one such lease exists to date.

Revenue payments to the lessor have so far been based on a proportion of the standard land rent offered for grazing leases plus a proportion of the stumpage revenue that would have gone to the lessor if the lease had been purely for forestry. This is similar to the combined annual rent and revenue sharing method outlined in section 7.3, except that the lessee receives the returns from grazing as well as his share of stumpage revenue.

In farm-forestry leases tree stocking per hectare is deliberately reduced to allow for pasture development, and consequently a minimum stocking must be mutually agreed upon.

7.6. Increased investment by the lessor

In accepting the possibility of a mixed annual rent and revenue sharing arrangement, the further possibility arises of the lessor wanting to increase his equity in the forest by monetary investment. Most lessors receive substantial income once harvesting starts; reinvestment in afforestation is one possible use of this income. Investment in the forest could take the form of the lessor paying for certain forest operations, or allowing the lessee to retain all or part of the lessor's revenue and use it in re-afforestation.

The lessor's wish to increase his equity would depend on his alternative uses of funds and the yields from other investment opportunities, as well as the general desire on the part of Maori land owners to partake in the management of their land. Increased equity would give them a strong basis for obtaining direct involvement in management.

7.7. Discussion

Apart from the financial effects of the alternative methods of determining returns to the lessor, non-monetary effects also need to be considered. The main non-monetary effect of importance to Maori land owners would be the amount of control they could exercise over the use of their land. The trend for Maori land owners to want increased control in the use of their land (see Chapter 2), partly results from the afforestation leases nearly all being revenue sharing agreements. Since the land owners have an equity in the forest they are keen to protect that interest and ensure it is used to best advantage. Maori owners opting for an annual land rent are excluded from equity in the forest. Another strong reason for Maori lessors wanting increased control over the use of their land is related to the strong ties between them and their tribal lands.

CHAPTER 8.

LEASING IN FIJI AND POSSIBILITIES ELSEWHERE

8.1. Fiji afforestation leases.

8.1.1. General background

Developments in land leasing for afforestation in Fiji were quite independent of those which have occurred in New Zealand, although some aid in the form of finance and forestry expertise has been supplied by the New Zealand Government. Leasing in Fiji has only occurred between the Fiji Government and the native land owners, the whole project being administered by the Fiji Pine Commission.

Afforestation in Fiji developed after research undertaken between 1954 and 1968 by the Fiji Forestry Department showed that Caribbean pine (*Pinus caribaea* Mor.) would grow successfully on relatively infertile soils. All land in Fiji had previously been surveyed and registered under tribal ownership. This made leasing for afforestation relatively easy since ownership was undisputed. Also, since most land was owned by natives or by the crown, and most Indian sugarcane farmers operate on leased land, the concept of leasing was well established. The first leases were either directly with the Forestry Department or to the Forestry Department through the Native Land Trust Board, who acted on behalf of the land owners. The Native Land Trust Board is responsible for administering all agreements on native lands.

An intensive study of pine afforestation in Fiji by the United Nations Food and Agricultural Organisation (FAO) in 1971 indicated that Fiji was in a good position to carry out large scale pine afforestation, both on economic and social grounds (Thompson unpubl. 1975). FAO proposed an afforestation scheme which to be economically viable would require approximately 54,250 ha of land with approximately

20,200 ha being required by 1978. Some 7,300 ha of exotics had already been established by 1971, but this area was rapidly increased to 15,800 ha by 1975 and to 20,150 ha by 1976 (Anon undated). By then some 68,900 ha had been leased for afforestation which indicated the willingness of native land owners to 'invest' their land in the project.

A Ministry of Information reference paper describing the scheme indicates that it is expected harvesting and processing into wood chips or pulp will begin in 1981.

8.1.2. The basis of afforestation and the role of Government.

The Fiji Government implemented FAO's proposals in 1972, largely because of the programme's expected impact on economic development in Fiji, and the benefits that would accrue to the rural areas and the indigenous Fijian land owners. The project was estimated to cost \$F 64 million by 1989 if no revenue was available before that date (Thompson unpubl. 1975). While the project only generates its first revenue in 1982, they should be sufficient to clear all debts by 1989. Development loan capital had been obtained by the Fiji Government from the Commonwealth Development Corporation.

As the development was primarily for the tribal groups who invested their land in the project, all leases contain provisions for each tribal group to take over management of the forest on their land after they form a legal corporate entity, with the necessary knowledge and experience. In each case, this takeover of forest management requires the agreement of the Fiji Government and the Native Land Trust Board. Training schemes are being run to enable the land owners to gain the necessary experience and knowledge.

In 1976 the Fiji Pine Commission was established as the statutory body responsible for administering the Pine Scheme. Apart from payments to the land owners (as provided in the

terms of the leases (see section 8.1.3)) all revenues generated by the project are to be used by the Commission to repay loan funds and recoup the costs of development. Once all debts have been repaid, the only benefit the Government will receive from the project will be its share of revenue from the 13% of the total proposed plantation area it owns as crown land (Anon undated). The role of the Fiji Pine Commission after all debts have been repaid is uncertain, but since a body will be needed to co-ordinate the activities of the groups of land owners, it is likely to fill that role.

8.1.3. Returns to the land owners

Before the FAO proposals were implemented the Government paid a nominal annual rent to land owners of \$F0.12/ha (Thompson unpubl. 1975). Economic evaluation of an expanded afforestation project carried out by FAO indicated that better lease terms could be afforded. In 1973 the terms were adjusted so that the annual rent on planted land rose to \$F 1.24/ha with a payment of \$F 0.25/ha for a maximum of five years on land waiting to be planted. Unplantable land within the leased area also received an annual rental of \$F 0.25/ha. Rents are to be reviewed every 10 years with a maximum increase at any one review of 40%. The lessor's share of revenue was set at 3% of the stumpage revenue received with a minimum payment to the land owner of \$F 49.40/ha providing rotations exceed 20 years. For shorter rotations pro rata rates apply. Land owners were also given a lump sum payment of \$F 3.09/ha when the lease agreement was signed. The term of the leases was 99 years.

Rent payments were based on 5% of the unimproved capital value of the land (Kamikamika 1977). The \$F 1.24/ha annual rent would give an unimproved land value of \$F 24.80, but since there is no active market for land in Fiji and land values were determined by the FAO study, land values must have been based on estimates or calculated residuals.

Individual members of tribal groups investing their land in an afforestation lease are usually given preference for seasonal work as one of the benefits accruing to land owners and to train land owners in forestry. Once forest development costs have been met by the Fiji Government out of forest revenue, substantial income will accrue to land owner groups which may be used for housing and community development, though both Thompson (1975) and Anon (undated) suggest land owner groups could use the income to buy logging equipment which will be required from 1982 onwards, thus providing more jobs.

8.1.4. Comparison to land leasing for forestry in New Zealand

The basic differences between leasing in Fiji and New Zealand have arisen because of the different objectives. Afforestation leasing in Fiji is specifically for the benefit of indigenous land owners, while in New Zealand benefits to the Maoris arise because they own the land required for the expansion of the New Zealand exotic forest estate; leasing was not developed primarily for their benefit. The New Zealand Government is not prepared to develop Maori land for the owners using forestry as a means of development, although it has done so in the past using agriculture. Private companies leasing land for forestry do so to ensure future supplies of raw materials which they attempt to obtain at minimum cost.

Leasing in Fiji is coordinated nationally, with uniform lease conditions and co-operative marketing. In New Zealand there is no coordination of Maori leases, which are generally treated differently by different lessees, and even individually by the same lessee. The lessor's returns are dependent on the actions and decisions of the lessee as applied to their individual leases.

There is also different emphasis placed on the importance of land (Watt pers. comm. 1977). The Fiji Pine Commission usually obtains land wherever the owners are prepared to enter into a lease agreement. Land use is not planned or determined by market forces, and economic land value is of no direct importance as a result. In New Zealand, however, land use is mainly determined by market forces, although some land use planning has been done e.g. for afforestation in the King Country (Anon 1977d).

8.2. Possibilities elsewhere

Leasing land from native land owners for afforestation has potential in places other than Fiji or New Zealand. Timber producing areas such as South East Asia and the Pacific, still rely on exploitation of native forests which must be replaced by plantations at least in part, if the countries concerned wish to maintain their forest industries.

As a prerequisite to leasing, land must be surveyed and registered by ownership to facilitate leasing and to identify beneficiaries. Ownership can be vested in a tribal group or clan, requiring only the definition of inter-tribal or inter-clan land boundaries.

A forestry lease scheme must be profitable, especially if forest development capital is obtained as loans. This implies efficient production and access to markets willing to pay the necessary price or prices. However, where land owners also work on the project, they will derive benefits even if the project breaks even financially.

If development capital is obtained as loans, development will benefit the land owners exclusively as in Fiji. Alternatively, forest development can be financed by private interests as in New Zealand. Although this option means that some of the returns will accrue to the private concern, there is the added advantage that a private concern provides

forestry expertise and usually has access to marketing facilities.

Forestry projects on native owned land confer national benefits as well as benefits to the owners of the land. National benefits include rural development, improved per capita income in rural communities, reduction of urban drift and the utilisation of idle resources including land and labour. These benefits can be of special importance to developing countries.

Leasing offers a method of implementing rural afforestation to benefit both land owners and the nation as a whole.

CHAPTER 9.DISCUSSION

Although leasing has brought into production large areas of previously unutilised Maori land, there are some aspects which may be undesirable from the Maori point of view and require examination and possible modification.

Most importantly, each lease agreement must be thoroughly examined and all the implications clearly explained to Maori land owners. Since Maori land owners generally prefer to get their return from an afforestation lease as a share of revenue rather than an annual land rent, afforestation leases are joint investments and Maori land owners share risk and uncertainty with the lessee. Maori land owners are now recognising that they should consider not only the percentage of stumpage revenue offered in a lease proposal, but also the afforestation proposal and likely revenue, and the extent to which they are involved in management.

The contribution made by Maori land owners to afforestation leases has generally been determined by residual valuation procedures where the lessee calculates the amount he can afford to pay the land owner for the use of the land after meeting all other costs and an allowance for profit. This approach is the basis of the Grainger and discounted revenue methods of sharing revenue, and does not recognise the land owner as an investor in his own right. Only the IRR method recognises the land owner as an investor and requires the land to be independently valued, the lessor's share of revenue ultimately depending on that valuation.

Recognising the Maori land owner as an investor is important because it helps to ensure that he gets a fair

return based on the use of his land and in the absence of any Government protection there is no other means of doing this. Investors normally either require a risk free return, as, for example those investing in Government bonds or securities, or they are prepared to carry a degree of risk and uncertainty in the expectation of a correspondingly higher return in compensation. To be able to evaluate his options, the investor should know the risks involved and his likely returns. An investor may try to safeguard his investment, either by seeking security for his loans, or by obtaining some control in the operation of the company, as in the case of share holders who can vote to accept or reject management proposals which affect their returns. Loan or debenture holders only invest their capital for the term of the loan which rarely exceeds 20 years. Shareholders, on the other hand, can recoup the current market value of their investment by selling their shares. Maori land owners are not receiving comparable treatment when investing in most afforestation leases.

In revenue sharing afforestation leases, not only does the lessor partake in all the risks and uncertainties involved in forestry, but in addition he generally has no control over the species to be grown, the management of the crop, the end product or its marketing. All these factors affect the return to the lessor and there is no guarantee he will gain a greater return than if he had opted for a risk free annual rent. Further most leases signed to date have a 99 term which is an exceedingly long time to tie up an investment yielding uncertain returns.

Lease documents are generally not specific enough to allow a full evaluation of the lessee's proposals. In view of the special problems and the long term nature of most forest investment, it is essential that Maori land owners are given much more information on the proposed use of their

land than has occurred in the past. Those aspects which require clearer definition in most lease agreements are:-

(a) A statement specifying the product to be grown. Terms such as "a high yield of marketable forest produce" are not specific enough.

(b) Timing and rate of development. Land left idle reduces both the volume of wood that can be produced and the land owner's return. One method of reducing these effects would be for the lease to specify that the lessee pay the lessor an annual rent on unplanted land, as is done in Fiji.

(c) The forest management practices and rotation lengths to be followed. Although it would be undesirable to make any proposed management regime rigidly binding regardless of changes in technologies and markets, an indication of the management regimes likely to be used is essential for the evaluation of any lease proposal. Some existing leases did indicate in general terms the plans of the lessee but these were usually not given in sufficient detail.

The N.Z. Forest Service lease agreement is perhaps the best in this regard although it was still rather vague. The N.Z. Forest Service agreed to grow a forest "to achieve the maximum financial yield". This at least provides a criterion on which to base decisions of species selection, product choice, rate of development, management regime and rotation length.

Shorter lease terms seem to be highly desirable. They would allow the lessor to re-evaluate his decision to invest his land in forestry more frequently. Ideally this should be at the end of each rotation, although this would affect the availability of forestry land to the lessee. A move towards shorter leases of 70 to 75 years has already occurred, but many Maori land owners feel this is still too long as it will prevent several generations of owners from having any effective

control over the use of their land.

The general conditions outlined in lease agreements also require tighter definition. The following areas are frequently poorly defined:-

(a) The starting date, the term of the lease and the expiry date should be clearly defined and should not depend on some action of the lessee, such as the date of planting.

(b) The condition in which the land is to be left at the expiry of the lease should be clearly stated and the lessor should have the power to direct the lessee as to whether or not he wants the land reforested in the last rotation period of the lease, at the lessor's expense. Some leases allow the lessee to continue with afforestation until the lease expires and then charge the cost of the forest, which will not be harvested before expiry of the lease to the lessor, whether the lessor wants this or not. This situation is totally unacceptable.

(c) The lessor should not be constrained in any way should he decide to sell his land. Some leases confer first option to buy on the lessee.

(d) Where the lessor has no say in forest management, the lessee should insure the forest against loss of stumpage income, covering at least that part of revenue which would have been paid to the lessor had there been no fire or other calamity. This protects the lessor against those risks over which only the lessee has any direct control e.g. fire protection.

(e) The lessor should have some control over the marketing and sales of the product or else these aspects should be subject to agreement with the lessor. This would reduce the lessor's dependence on the marketing abilities of the lessee.

(f) Allowable reasons for terminating a lease in the event of default should be explicitly defined and an equitable method of apportioning ownership of the remaining forest specified. Both parties should have power at all times

to apply to the other for a termination of the lease.

Diversity of conditions between existing leases which are not related to differences in the land's productivity or location may give rise to contention. Improvements in lease terms over the last ten years may induce some of the lessors in early leases to press for a renegotiation of their lease. After ten years leasing experience a more uniform basis for all afforestation leases should be formulated. Maori lessors could then draw on available experience before signing new leases.

Of the three methods that have been used to calculate the lessor's share of stumpage revenue, only the IRR method recognises the Maori land owner as an investor and shares revenue equitably according to the contributions lessor and lessee make to the lease. However, two aspects of the IRR method require more explicit definition. Firstly, a clear explanation of the method should be given for the benefit of Maori land owners, particularly as suspicion is created because the method does not define the percentage of stumpage due to the lessor before the lease is signed. Secondly, the costs to be included in the IRR calculations need to be clearly defined. The time at which the lessor's land ceases to contribute to the forest investment is just prior to clearfelling and only those costs which contribute to growing a standing mature forest, and to the operation of the lease, should be included.

Market land value should be used to measure the lessor's cost contribution in the IRR calculation since this effectively measures the value of the contribution. Because returns from forestry and grazing are similar, market land values for grazing land are an acceptable measure of the value of the land if used for forestry. Real changes in land value should be recognised and included in the calculation.

The most inequitable treatment received by Maori land owners arises from provisions of the Department of Inland Revenue by which incentives for increased investment in private forestry were introduced. The benefits of the incentives accrue to the provider of capital, whereas the land owner receives none even though he invests his land in forestry. To restore equity, the lessor must be recognised as an investor, and the incentives should be redistributed to benefit both the provider of capital and of land. Although the N.Z. Forest Service cannot claim any tax incentives, Maori land owners investing their land with the Forest Service should also benefit as the land owner is still a private investor.

These criticisms apply mainly to revenue sharing agreements where the lessor is forced to share in the risks and uncertainties. A risk free annual rent overcomes most of these criticisms as the lessor's return is independent of the actions and decisions of the lessee. The lease document would also be simpler, and many potential points of contention removed, generating better relationships between the lessor and the lessee.

The Department of Maori Affairs has, for a long time, overseen agricultural leases on Maori land, but has not become involved in afforestation leases. Assisted by the Maori Land Court (which has statutory powers to deal with Maori land matters), the Department of Maori Affairs could provide an advisory service for lessors and could act on their behalf when the need arose. Manpower requirements would not be excessive as the number of leases negotiated at any one time is not large. Should Government funding be unavailable, the cost of providing such a service would represent only a small portion of the potential income to lessors. Since the N.Z. Forest Service is a lessee, forestry expertise would have to be provided by an independent authority.

These suggestions, however, go against the recommendations of the Pritchard report (1965), which were based on the belief that Maoris had achieved a greater ability to manage their own affairs. Ten years of experience with afforestation leases has shown that Maoris are not familiar with European competitive and bargaining methods, and have only limited knowledge of and experience in dealing with afforestation leases. The availability of expert advice and the benefit of previous leasing experience is a prerequisite to giving the Maori equal bargaining power.

The best prospects for leasing Maori land for forestry depend on the Maori land owners' desire for meaningful involvement in the use of their land. Leases based on an annual rent give the best financial return to the land owner when recent trends in land values and stumpages are taken into account. Also annual land rent gives the lessee complete freedom to act as he sees fit in his forestry development and management, and places all the risks on him as the sole decision maker. However, an annual land rent does not allow the lessor to claim involvement in management. Only through a revenue sharing agreement does the lessor obtain equity in the forest and have a justifiable claim to involvement in decision making. Should the Maori land owner opt for a revenue sharing lease agreement, the implications should be clearly explained to him. The current situation where the Maori land owner receives a share of revenue but does not have involvement in forest management is unacceptable.

LIST OF REFERENCES

- Anon 1976a. New Zealand Official yearbook.
Dept. of Stats. Govt printer. Wellington.
- Anon 1976b. Costs of establishing and managing radiata pine plantations. N.Z. For. Ser. Info. Series No.74.
- Anon 1976c. Export opportunities for quality logs. For. Res. Inst. Ann. Rpt. 1975, Wellington. p24-26.
- Anon 1976d. Sheep and beef farm survey 1974/75.
N.Z. Meat and Wool Board Econ. Ser. Public No. 1755.
- Anon 1977a. The Australian softwood products industry. Bur. Ag. Econ. Canberra. AGPS 182pp.
- Anon 1977b. N.Z. Herald. 15/11/77.
- Anon 1977c. N.Z. Herald. 20/12/77.
- Anon 1977d. King country land use study - stage I report. Dept. of Land and Survey. Wellington.
- Anon 1977e. Quarterly predictions - national income and expenditure. N.Z. Inst. Econ. Res. Dec. 1977 Wellington.
- Anon 1977f. Forestry Encouragement Grants. N.Z. For. Ser. Inf. Series No.58, 3rd ed.
- Anon. undated. Pine growing - a partnership between land owners and government. Fiji Min. of Info. Ref. paper No.2.
- Brown J.B. 1966. Rural land administration in New Zealand. N.Z. Inst. Publ. Admin. Oxford Univ. Press London.
- Bunn E.H. 1974. Production forestry in the 1980's. N.Z.J.F. 19(2) 181-190.
- Cairncross A. K. 1973. Introduction to economics. 5th ed. Butterworths London.
- Carter A. 1978. Ngatihine lease. For. Ind. Rev. 9(4)3.
- Clark C. 1973. The value of agricultural land. Pergamon Press. Sydney.

- Ellison C. 1977. Productivity statistics of New Zealand agriculture. 1960-1975. Ministry of Agric. and Fish. Econ. Div. Res. paper 5/77.
- Fenton R.T. 1972. Implications of radiata pine afforestation studies. N.Z.J.F.Sc. 2(3) 378-387.
- Fenton R. T. 1977. Douglas fir profitability. Letter to the editor. N.Z.J.F.Sc. 6(3) 475.
- Fenton R. T. and Merle Dick M. 1972a. Profitability of Radiata pine afforestation for the log export trade - on site index 80. N.Z.J.F.Sc. 2(1) 69-99.
- Fenton R. T. and Merle Dick M. 1972b. Profitability of Radiata pine afforestation for the log export trade - on site index 110. N.Z.J.F.Sc. 2(1) 100-127.
- Fenton R. T. and Merle Dick M. 1972c. Profitability of "Normal" afforestation for the overseas log trade on site indexes 95 and 110. N.Z.J.F.Sc. 2(3) 289-312.
- Fenton R. T. and Tennant R. B. 1976. Export log afforestation 1973. N.Z.J.F.Sc. 5(3) 323-346.
- Fenton R. T. and Tustin J. R. 1972. Profitability of Radiata pine afforestation for the log export trade - on site index 95. N.Z.J.F.Sc. 2(1) 7-68.
- Grainger M. B. 1968. Problems affecting the use of Faustmann's formula as a valuation tool. N.Z.J.F. 13(2) 168-83.
- Grainger M.B. 1969. Leasing of forest land on a royalty basis. N.Z.J.F. 14(1) 5-24.
- Johnson R. W. M. 1977. Agricultural output and the growth of export income. Ministry of Agric. and Fish. Econ. Div. Res. paper 9/77.
- Kamikamika J. N. 1977. Forest lease terms. Circular No.12 of 1977. Nature Land Trust Board. Fiji.
- MacPherson S. J. 1974. An economic evaluation of afforestation with Radiata pine on Tawarau forest. N.Z.J.F.19(1)46-56
- Mathur R. S. 1975. Comments on "Return from standing timber in project evaluation analysis of Maharashtra project." Indian Forester 101(12) 727-729.

- Misra D. N. 1975. Return from standing timber in project evaluation analysis of Maharashtra project. Indian Forester 101 (12) 723-726.
- Molloy M. 1978. Forestry co-operatives: an alternative. For Ind. Rev. 9 (4) 3.
- O'Keefe J.A.B. 1974. The legal concepts and principles of land value. Butterworths Pty Ltd Sydney.
- O'Neill G. M. 1974. Forestry production and planting targets. N.Z.J.F. 20(1) 83-88.
- Plunkett H. J. 1972. Analysis of land and survey development projects 1945-1969. Lincoln coll. Agric. Econ. Res. Unit. Rpt. No.68.
- Pritchard I. and Waetford H. T. 1965. Committee of enquiry into laws affecting Maori land and the jurisdiction and powers of the Maori Land Court. Dept. of Maori Affairs, Wellington.
- Rothery J. E. 1945. Some aspects of appraising standing timber. J. For. 43 (7) 490-498.
- Rustagi K. P. 1977. Long term lease of forest land - Its economic evaluation. Indian Forester 103 (4) 235-239.
- Samuelson P. A., Hancock K. and Wallace R. 1975 Economics 2nd Aust. ed. McGraw-Hill Syd.
- Smith B. H. 1974. Financial consideration for achievement of targets. Address given at N.Z. For. Dev. Conf. Wellington.
- Smith N. 1960. Maori land law. A. H. and A. W. Reed Wellington.
- Thomson A. P. 1974. Land requirements and considerations for target achievements. Address given at N.Z. For. Dev. Conf. Wellington.
- Ward J. T., Parkes E. D., Grainger M. B. and Fenton R. T. 1966. An economic analysis of large-scale land development for agriculture and forestry. Lincoln coll. Agric. Econ. Res. Unit. Public. No.27.
- Wendleken W. J. and Hannan R. F. 1974. Land - The prime resource. Address given at N.Z. For Dev. Conf. Wellington.

LIST OF PERSONAL COMMUNICATIONS

- Alexander J. G. 1975. Trustee on Ngatihine trust.
Kawakawa.
- Allison B. J. 1977. Assistant forest manager.
N.Z. Forest Products Ltd.
- Anon 1978a. Department of Maori Affairs. Wellington.
- Anon 1978c. Inland Revenue Department. Wellington.
- Gillanders-Scott K. 1978. Chief Judge Maori Land Court.
Rotorua.
- Groome J. G. 1977. Forest consultant. Taupo.
- Groome J. G. 1978. Forest consultant. Taupo.
- Hingston H. K. 1978. Lawyer representing Maori trustees.
Rotorua.
- Hood J. C. M. 1977. N.Z. For. Ser. Wellington.
- Kirkland A. 1977. Deputy Dir. Gen. N.Z. For. Ser.
Wellington.
- Liley W. 1977. Forest consultant. Taupo.
- Mercer N. J. 1977. Manager - Winstone Afforestation Ltd.
- Watt G. R. 1977. For. Res. Inst. Rotorua.
- Williams R. W. M. Director Forest economics N.Z. For. Ser.
Wellington.
- Young I. M. 1978. Accountant.

LIST OF UNPUBLISHED MATERIAL

- Allison B. J. 1975. Land valuation and revaluation in afforestation leases. Unpubl. notes.
- Anon 1974. Investment in forestry in New Zealand.
J. Groome and Assoc. Taupo 11pp.
- Anon 1976a. Investigation into long term leases of Maori land for Forestry. Rpt. prepared for Min. of Maori Affairs. Wellington 10pp.
- Anon 1977. Report of the agricultural review committee to the Minister of Agric. and Fish. Feb. 1977.
- Anon. undated a. Forest Plantings. Dept. Maori Affairs Wellington 5pp.
- Fenton R. T. 1969. The rate of interest in forestry.
For. Res. Inst. Econ. of Silv. Rpt No.9. Rotorua.
- Fenton R. T. and Grainger M. B. 1965. Economic results from afforestation of the Maraetai blocks - parts I and II.
Res. Inst. Silv. Branch Rpt No.31. Rotorua.
- Fenton R. T., Grainger M.B., Sutton W. R. J. and Tustin R. J. 1968. Profitability of Pinus radiata pulpwood afforestation. For. Res. Inst. Econ. of Silv. Rpt No.7.
- Roper R. and Fraser T. 1978. Forestry taxation in New Zealand. Econ. of Silv. Rpt 108. For. Res. Inst. Rotorua.
- Telfer B. 1977. Notes on arbitration.
- Thompson W. 1975. Notes for meeting with landowners of pine areas. Perm. Sec. For. Agric., Fish. and Forestry Fiji.
- Watt G. R. and Fraser T. 1978. Forest Valuation part I - Principles and practices of valuing forests and forest land in New Zealand. Draft report. For. Res. Inst. Rotorua.

Appendix 1.

MAORI LAND LAW.

This appendix presents a brief outline of the development of Maori land law. The current provisions covering the alienation of Maori land are described.

Appendix 1.

Maori Land Law.

English law was formally established in New Zealand in 1840 by the treaty of Waitangi, which guaranteed the Maoris "the full exclusive and undisturbed possession of their land and estates forests fisheries and other properties which they may collectively or individually possess as long as it is their wish and desire to retain the same in their possession". It went on to provide that the Maoris yielded to the Crown the exclusive right of pre-emption over such lands as the owners may desire to alienate at a price agreed upon between the owners and persons appointed by the Crown to treat them on that behalf. The Maoris were thus at once given full ownership rights to their land and protected by the Crown from unscrupulous land deals whereby previously large parcels of land were bought by Europeans for as little as an axe or a blanket.

Prior to English law, Maoris had no known system of succession to land in general. The present practice of granting succession developed from the ancient custom of only passing on rights to small areas of land which were personally held for cultivation (Smith 1960). Under that custom, the successors to such limited rights were the next of kin to the deceased by that line of descent through which the rights were derived.

It was not until tribal land became subject to titles recognisable to European law that the so called Maori custom of succession became established. Under present law, regardless of whether a will was left or not, the beneficiaries are the children of the deceased, each of whom gets an equal share of the land. As the descendants die, their children in turn divide their parents share.

Today, Maori owned land falls into three categories (Brown 1966):-

(1) Customary land, the title to which has not been established by the Maori Land Court. Very little remains in this category.

(2) Customary land, the title to which has been established by the Maori Land Court. The Maori owners receive either a Crown grant or a certificate of title under the Land Transfer Act 1952, which gives them freehold tenure.

(3) Freehold land.

Only land of categories 1 and 2 are 'Maori' land for the purposes of Maori land law.

The Maori Land Court was established by the Native Lands Act 1865 for the following purposes (Smith 1960):-

(1) To settle and define the proprietary rights of Maoris on the land held by them under their customary tenure.

(2) To convert the Maori customary title into a title recognisable under English law.

(3) To facilitate dealings with Maori lands and the peaceful settlement of the country.

(4) To remedy the invidious position occupied by the Crown. Prior to 1865, the Crown often found itself in the invidious position where it had recognised a doubtful claim to title or alternatively where it had to pay twice to contesting claimants for the same piece of land. There was no doubt that the Maori wars began through disputes over title to land.

The Maori Land Court upheld all titles as they stood when the treaty of Waitangi was signed in 1840, and refused to recognise titles founded on inter-tribal warfare since that year. It changed the then common warfare over land into a verbal contest in the court itself.

When initially established, the Maori Land Court had no authority to control the sale of Maori lands. At that time Maoris did not yet appreciate the value of land ownership and many were encouraged to exchange their land for European goods. Grave abuses resulted and the Government passed the first Native Lands Frauds Prevention Act in 1870 to protect the Maoris in their land transactions with Europeans. This Act was repealed by the Native Lands Frauds Prevention Act 1881, which was also replaced by the Native Land Court Act 1894.

The Native Land Court Act gave the Maori Land Court the power to confirm all alienations of Maori land i.e. both sales and leases. The Act also established the Maori Appellate Court specifically to deal with appeals against orders of the Maori Land Court. The Judges of the Maori Land Court are also the Judges of the Appellate Court and any two or more of them had the power to act as the Appellate Court.

The Maori Affairs Act 1953 provided for the continuation of both the Maori Land Court and the Appellate Court. However, the Maori Affairs Amendment Act 1967 restricted the power of the Maori Land Court to confirmation of alienations of Maori land by way of sale only. The Modern Maori Land Court is in effect a guardian of the Maori land owners and Maori interests.

The inevitable result of the so called Maori custom of succession to land are obvious, and its continued use would have serious consequences on the future interests and welfare of the Maori people, and to the best and most economic use by them of their land. The Maori Trustee was created in an attempt to solve this problem. The Maori Trust Office is part of the Department of Maori Affairs and is headed by the Maori Trustee, who has similar status and function to the Public Trustee. The Maori Trustee is responsible for the administration and leasing of large areas of Maori land and for distributing the proceeds to the owners. The Maori Trustee has extensive lending powers used principally for the settlement and improvement of Maori land, for the establishment of Maoris in business, and for housing purposes. Most advances are made on the security of Maori land.

The Maori Affairs Act 1953 and amendments, outlines the means by which Maoris may alienate their land. Alienations may be effected by:-

- (1) The owners as individuals. Here the onus is on the potential lessee or buyer to ensure that all the beneficial owners agree to an alienation. In the case of a lease, if all the beneficial owners do not sign, the lessee would not have exclusive right to possession of the land, and the lease would

be a joint possession with those owners who had not signed.

(2) The owners as a group. The majority of owners may resolve to alienate the land regardless of the wishes of the minority. However, the rights of the minority are protected by their right to apply to the Maori Land Court for a partition of their interest in the land.

(3) The Maori Trustee. Maori owners may elect to pass control of their land over to the Maori Trustee who acts on behalf of the Crown. The Maori Trustee then becomes the statutory agent of the owners, and acts on their behalf in the matter of alienation and for the variation of the terms and conditions of any lease.

Maori owners may also elect to have their common interest in land represented by a corporate body or a trust set up under the direction of the Maori Land Court. Where Maori land is owned by more than three persons as tenants in common, those owners may be incorporated. Administration of a corporation is by a committee of management elected by the owners and appointed by the Court. A trust can be set up by the Court either on application to it by land owners, or of its own decision during the course of any proceedings before it. The order vesting the land in the trustees must be approved by the Minister of Maori Affairs. Both a corporate body and a trust act as trustee for the land owners, have the power to alienate the land as if they were the beneficial owners, and can raise loans using the land as security. Most existing afforestation leases are signed by a corporate body or by trustees representing the land owners.

Under the provisions of the Maori Affairs Act 1953, all Maori land leases are limited to a term of 50 years including terms of renewal. As afforestation leases are specifically excluded from this provision, there is no legal limit on their term.

Appendix 2.

STANDARD CONDITIONS OF LEASE - AGRICULTURAL LEASES.

The following are the standard terms and conditions of agricultural leases held by the Maori Trust Office. Afforestation leases are generally based on these, except that agricultural requirements are removed, and the lessee's obligation with respect to establishing a forest and the method and basis of paying the lessor are included.

MAORI TRUST OFFICE

STANDARD

TERMS AND CONDITIONS OF LEASE.

1. THAT the Lessee will pay the rent hereby reserved at the times hereinbefore appointed for the payment of the same free of exchange at the Maori Trust Office at Rotorua or such other place or places as the Lessor may from time to time direct.
2. The Lessee will during the said term and as and when the same shall become due and payable duly and punctually pay and discharge all rates taxes charges including electric light and power charges and assessments (other than Landlord's Land Tax) which during the said term may be rated taxed charged assessed or made payable in respect of the said land (all such rates charges and assessments in respect of the first and last years of the said term being apportioned between the parties and the Lessee will pay his portion thereof whether or not the same shall be due and payable before the commencement or after the termination of the term hereby created).
3. THAT the Lessee and his successors in title respectively shall not assign sub-let or part with the possession of the land hereby demised or any part thereof without the consent of the Lessor in writing first had and obtained PROVIDED THAT such consent shall not be unreasonably or arbitrarily withheld in the case of a reputable assignee sub-tenant or under-lessee.
4. THAT the Lessee will within two years of the commencement of the term of the within lease erect and put upon the boundaries of the land herein demised or upon such boundaries upon which no substantial fence exists a "sufficient fence" within the meaning of the Fencing Act 1908.
5. THAT the Lessee will at all times during the continuance of the said term repair and keep and maintain in good and substantial repair all buildings and other erections fences gates hedges culverts dams drains crossings fixtures stockyards and every description of improvement now or hereafter standing or being upon or growing on the hereby demised land and will renew all such parts thereof as shall become decayed or unserviceable and will at the end or sooner determination of the said term yield up the same in like good order and condition and the Lessee will during the term and at intervals of not more than five years paint in a workmanlike manner all the outside (including the roof) woodwork and ironwork of all buildings now or hereafter to be erected upon the land hereby demised with two coats of proper oil colour or synthetic paints suitable for use in the locality.
6. THAT the Lessee will insure and keep insured to the full insurable value thereof all buildings of an insurable nature for the time being erected upon the demised land in the name of the Lessor or as the Lessor shall direct in some responsible insurance office in New Zealand to be approved by the Lessor and in the event of the said buildings or any of them being destroyed or damaged by fire (but subject always to the prior rights of any mortgagees of the said land) all moneys received by the Lessor under and by virtue of any such insurances shall forthwith be expended by the Lessor in reinstating or repairing the building or buildings so destroyed or damaged provided always that the Lessor shall in no event be bound to expend in reinstating or repairing such buildings or building any greater amount than that received by him as the proceeds of such insurance.

7. THAT the Lessee will prior to the expiration of the _____ year of the term hereby created and in each of the next succeeding _____ years clear stump and lay down in permanent English grasses and clovers of the descriptions and proportions usually sown in the district and suitable for the land not less than _____ acres of the land hereby demised.
8. THAT the Lessee will during the term cultivate use and manage all such parts of the said land as now are or shall hereafter be broken up and converted into tillage in a proper and husbandlike manner and will not impoverish or waste the same but will keep the same in good heart and condition and will at the end or sooner determination of the term and subject to the provisions of clause 15 hereof leave all such parts of the said land as shall be broken up in good permanent English grasses and clovers as provided in the preceding clause.
9. THAT the Lessee will use the most approved modern methods to suppress and eradicate all noxious weeds and plants that are such by law from time to time in the district in which the said land is situate growing on the said land or upon the near half of any adjoining road and will grub up and destroy all gorse growing as aforesaid otherwise than in or upon the true line of fence without contribution from the Lessor and will duly and punctually comply with all directions of the Lessor or his agent as to the methods to be used or otherwise and also with all the provisions of the Noxious Weeds Act 1950 and all amendments thereof and regulations made thereunder respectively provided always that the Lessee shall have no claim against the Lessor in respect of the reasonable expenses mentioned in section 10 of the said Act and the Lessee shall indemnify the Lessor against all and any contribution or contributions costs charges and expenses which the Lessor may be called upon or compelled to pay under the said Act.
10. THAT the Lessee will at least once in every year of the said term clean and open all ditches drains and watercourses on the said land and will keep the same clear and unobstructed at all times during the continuance of the said term.
11. THAT the Lessee will not at any time during the term hereby created overstock the said land and will not during the last year of the said term depasture upon the said land a greater number of stock than he shall have had depasturing upon the said land during the previous twelve months of the said term.
12. THAT the Lessee will while using the said land as a dairy farm in all respects comply with all the provisions of the Dairy Industry Act 1952 and its amendments and every Act that may hereafter be passed in amendment thereof or in substitution therefor and all the rules and regulations made or to be made thereunder so far as the same relate to the demised premises and under no circumstances shall the Lessor be liable to pay or to contribute to expenditure by the Lessee on buildings or other improvements upon the demised premises notwithstanding the provisions of the said Act or of any Act that may be passed in amendment thereof or in substitution therefor.

13. THAT the Lessee will not at any time during the continuance of the term hereby created without the written consent of the Lessor first had and obtained request or permit any Electric-power Board to install any motor electric wires electric lamps or other electrical fittings or equipment on or about the premises hereby demised or to do or cause or permit to be done any act deed matter or thing whereby any charge under section 119 of the Electric-power Board's Act 1925 or any amendment thereof shall or may be created upon the said premises in respect to the same.
14. THAT the Lessee will in a husbandlike manner and at the proper season for so doing in each year topdress so much of the land herein demised as shall be laid down in pasture with artificial manure suitable to the nature of the soil with not less than 3 hundredweight of such manure to the acre, and shall not less than twice a year in like manner harrow all pasture lands with triped or other suitable harrows.
15. THAT the Lessee will not during the said term take or permit or suffer to be taken from the said land or any part thereof more than three crops in succession one of which shall be a root crop and either with or immediately after a third crop of any kind the said land shall be laid down under pasture or summer fallow and be fallow for at least three years from the harvesting of the last crop before being again cropped and will at the expiration of the said term leave at least two-thirds of such land as has been cropped as aforesaid in good permanent English grasses and clovers as provided by clause 7 hereof.
16. THAT the Lessee will at his own cost and expense do all things necessary to comply with the provisions of the Rabbits Act 1955 and of any Act or Acts passed in amendment thereof or in substitution therefor and to keep the said land free and clear of rabbits and other noxious vermin and will indemnify the Lessor against all and any contribution or contributions costs charges and expenses which the Lessor may be called upon or compelled to pay under such Act or Acts.
17. THAT the Lessee will not allow pigs to roam at large over the said land but will at all times keep them in proper pig-proof enclosures not exceeding acres in extent.
18. THAT the Lessee will pay all costs and expenses incurred in the preparation and completion of these presents and all costs and expenses incurred by the Lessor in relation to any notice or any proceeding under the provisions of the Property Law Act 1952 and its amendments relating to forfeiture and relief against forfeiture (notwithstanding that, and whatever the means by which, such forfeiture may be avoided).
19. THAT the Lessee will keep any native bush or shrubbery shelter ornamental or other trees at any time growing upon the said land in good order and condition and will not without the consent of the Lessor cut down damage or destroy or permit to be cut down damaged or destroyed any of the said native bush shrubbery shelter ornamental or other trees at any time growing on the said land and will use all proper and reasonable means to preserve the same and will not without the like consent remove or permit to be removed from the said land any fencing posts timber or firewood PROVIDED HOWEVER that the Lessee may use for his own requirements on the said land for repairing or erecting fences and for firewood any logs or dead timber on the said land.

20. THAT the Lessee will not call upon or compel the Lessor or the owners to contribute to the cost of erecting, repairing and maintaining any boundary fence which may now or hereafter be erected between the land hereby demised and any land adjacent thereto in which the Lessor may have any estate or interest either in his own right or as agent or trustee for any owner: PROVIDED ALWAYS that this covenant shall not enure for the benefit of any purchaser or Lessee from the Lessor of such adjacent land so as to deprive the said Lessee of any rights he would have (but for this covenant) against the occupier (other than the Lessor) of any adjoining land.
21. THAT in burning off or lighting fires upon the demised premises the Lessee shall in all respects comply with the provisions of the Forest and Rural Fires Act 1955 and shall use every care and precaution to prevent fires from spreading to adjoining properties and will indemnify the Lessor and the owners against all claims for damage caused by any fire lit by the Lessee or his agents and so spreading on aforesaid and against all contributions costs charges and expenses which the Lessor or the owners may be compelled to pay pursuant to the provisions of the Forest and Rural Fires Act 1955 or otherwise howsoever.
22. The Lessor may at all reasonable times during the continuance of the term hereby created enter upon the said land by any agent officer or servant of the Lessor for the purpose of viewing the state and condition thereof and of the buildings and erections thereof.
23. THAT there are hereby excepted and reserved from this demise all milling timber, timber, flax, coal, lignite, stone, clay, kauri-gum and other metals or minerals whatsoever in or upon the land hereby demised, with full power and liberty to the said Lessor, his agents, servants, grantees, or licensees to enter upon the said land for the purpose of searching for, working, winning, getting and carrying away all such metals, minerals and other things so reserved as aforesaid, and for this purpose to make such roads, erect such buildings, sink such shafts, and do all such things as may be necessary: PROVIDED ALWAYS that the Lessor shall pay a fair compensation to the Lessee for all loss or damage sustained by the Lessee by the exercise of any such powers by the Lessor. The amount of any such compensation shall, in default of agreement, be determined by two arbitrators and in case the arbitrators cannot agree, by their umpire, in accordance with the provisions of the Arbitration Act 1908; and these presents shall for the purpose be deemed to be a submission under that Act.
24. THAT if the Lessee shall at any time make default in the performance of any of the covenants, conditions or provisions on the part of the Lessee herein expressed or implied it shall be lawful for the Lessor (without prejudice to any right of re-entry or other right) to perform any such covenant condition or provision on behalf of the Lessee (and if necessary for so doing to enter upon the said premises) and all moneys paid and expenses incurred in so doing and also all costs incurred by the Lessor in connection therewith shall be forthwith repaid to the Lessor by the Lessee together with interest thereon at the rate of ten pounds (£10) per centum per annum and shall be recoverable by distress under the Distress and Replevin Act 1908 or otherwise as if the same were rent in arrear hereby reserved and it shall be lawful for the Lessor or the Agent of the Lessor at all times for the purpose aforesaid and for the purpose of viewing the demised premises to enter upon the said premises with such workmen and other persons as the Lessor or the Agent of the Lessor shall think fit and to remain there for such time as in the circumstances shall be reasonable and proper.

25. THAT in case the rent payable hereunder or any part thereof shall be unpaid on any day on which the same ought to be paid and shall remain unpaid for thirty (30) days thereafter whether the same shall have been lawfully demanded or not or in case the Lessee becomes bankrupt or compounds with or assigns his estate for the benefit of his creditors or in case of the breach non-observance or non-performance by the Lessee of any covenant condition or restriction herein in the Lessee's part contained or implied then and in every such case it shall be lawful for the Lessor forthwith or at any time thereafter without notice or suit to enter upon any part of the said demised land in the name of the whole and thereby to determine the estate of the Lessee under these presents but without releasing the Lessee from liability in respect of any breach of any of the said covenants conditions and restrictions.
26. It is hereby declared that the covenants powers and conditions implied in leases by the Property Law Act 1952 shall be implied herein except in so far as the same are hereby modified or negatived.

Appendix 3.

"FOREST PLANTING"

An information booklet prepared by the Department of Maori Affairs, Wellington, as a guide for Maori land owners contemplating an afforestation lease.

FOREST PLANTING

This is a guide to help Maori Trusts and Incorporations decide the relative merits of planting for sawlogs or pulp. Because of cartage costs to an anticipated pulp mill, planting for pulp only may not be viable. Because of soil type or terrain, planting for sawlogs may not be possible.

The ideal would be to seek the advice of an independent forestry consultant, i.e., an expert not tied to a commercial timber company.

The two most common exotic forest crops managed in N.Z. are sawlogs and pulpwood and each one has its advantages and disadvantages. Subject to independent expert advice and before making any decision on the type of forest crop to be planted on an area of land it is vital that all the advantages and disadvantages be considered. These fall under a number of headings -

STUMPAGES

Stumpage is a technical term meaning the amount of money paid for wood before logging commences i.e., standing on the stump.

By the period 1990-2000 (15-25 years away) there will be massive surpluses of wood available in N.Z., far more than can be consumed locally and these surpluses will have to be exported. Prices paid for wood on the world market are dependant on quality. In 1972 for instance the price paid for pulpwood on the U.S. market was \$3 per cubic metre, for low quality sawlogs \$20 per m³ and for high quality sawlogs \$45 per m³. This gap has been getting wider ever since.

At the present time in N.Z. stumpages are held artificially low. This is possible because very little wood is exported. In future when the majority of N.Z.'s annual wood output is exported prices will be determined internationally just as they are now for beef and wool.

OVERSEAS FORESTS

Here in N.Z. we can grow the type of high quality sawlogs that are fetching such high prices overseas in as little as 25 years. These growth rates are far higher than can be achieved in Northern Hemisphere coniferous forests. These northern forests are being logged at such a rate

that by the period 1990-2000 the original virgin (ie. never logged) forests will be completely cutover and the quantities of high quality sawlogs available there will be severely reduced. From then on second growth stands only will be available. These stands are of low quality, trees are small and compared to N.Z. growth is slow. These trees are eminently suitable for pulp and paper production but not for high quality timber. Thus the supplies overseas of low quality wood are more than adequate but the opposite is true for sawlogs. Since we can grow sawlogs in 25 years we are in an excellent position to provide such material to overseas markets just when it is becoming scarce there.

STUMPAGE SHARING AND THE EFFECT OF TIME

Most leases of potential forest land are based on a share in the final profits as well as interim payments of relatively small amounts of money. The percentage of profits paid varies with the agreement. The percentage negotiated is of lesser importance than the royalty or stumpage received. It is easy to see this if the percentage offered in a pulpwood situation is say 25% and only 18% is offered in a sawlog situation. Working on the prices given earlier 25% of \$3 is 75¢ whereas 18% of \$20 is \$3.60 and 18% of \$45 is \$8.10.

This is not the complete situation however as in forestry ventures the effect of time must be taken into account.

Normally the length of rotation (time period from planting to logging) is 25 years for sawlogs and 15 years for pulpwood. Time is taken into account through the use of compound interest. Using a compound interest formula at a rate of 10% the figures change to:

25% of \$3/m ³	over	15 years	=	18c/m ³
18% of \$20 "	"	25 "	=	33c "
18% of \$45 "	"	25 "	=	75c "

Thus even though sawlogs take longer to grow and in this case the percentage is considerably less the return is substantially higher.

PULPWOOD FROM SAWLOG REGIMES

It is essential to realise that pulp and paper are very valuable products and their production in the future from N.Z.'s forests will no doubt be even more important than it is today. The point is however, that it is unnecessary to grow forests specifically for pulp as sawlog crops provide 50% of their total timber volume in wood available for pulping. An average radiata pine tree at clearfelling

contains 4-5 logs, only the bottom two of which contains high quality timber. The top logs are available for pulping. Also, within a sawmill only 50% of the log is actually converted to sawn timber the remainder is in sawdust and slabwood. The slabwood is available for pulping. This type of material is already used in N.Z.'s pulp mills.

PULPWOOD REGIMES

Once a decision has been made in the early years of a crop, either at planting or at 4-5 years not to carry out pruning or thinning the forest is committed to a low quality end use - chip and pulpwood. Thus there is no flexibility in the end product. If for some reason no plant is built it will be difficult or impossible to use the timber crop elsewhere and of course no use means no royalties. Further it cannot be argued that such material could be exported as countries overseas have large quantities of similar low quality wood.

In contrast to this, wood grown in sawlog crops is available for a multitude of end uses including pulping if absolutely necessary.

The only real advantages that pulp wood crops have are:

1. Very little capital is spent on the crop and the money can therefore be used elsewhere by the forest owner or lessee.
2. Rotation lengths are shorter than for sawlog crops, this means that not only is a financial return received earlier but the trees are at risk from natural forces for a shorter time.

The chances of windthrow increase as trees grow larger and where cyclonic storms occur this can be important.

ROTATION LENGTHS

The fact that pulpwood crops are clearfelled earlier than sawlog crops means that if a forestry venture is starting from scratch the first royalties come in sooner, perhaps as much as 10 years sooner. But it must be remembered that once a venture has been going for a period of time the yearly return is larger under a sawlog regime. Calculations show that despite time, compound interest and having less area felled per year a fully planted sawlog forest will produce at least 3 x (three times) as much royalty per annum as a pure pulpwood forest. It is obvious that the 10-year initial difference in start of royalties will very soon become insignificant if sawlogs are grown.

ENERGY REQUIREMENTS

Pulpmills require from 16-44 times as much energy as sawmills do to convert one cubic metre of roundwood to a final product. With scarce energy, a problem now and no doubt a problem in the future huge mills consuming lots of electrical energy will be undesirable.

EMPLOYMENT

Growing of timber for sawlogs is far more labour intensive than growing timber for pulp. Mainly this is because there are more operations carried out on the crop after planting and before felling, i.e., pruning and thinning. Also clearfelling of pulpwood crops is better suited to automation because of the small size of the trees and the lack of need to segregate logs, i.e., all logs go to the pulp mill. In the case of sawlog felling only some logs go to the pulp mill. In the case of sawlog felling only some logs in a tree (2 out of 4-5) are of high quality and so segregation is required, also trees are far larger and not so easy to log completely mechanically.

Within tending operations alone in a sawlog regime there is one more permanent job for every extra 227 ha of forest over and above that required for pulpwood crops. This would mean that a 5,000 ha sawlog forest would employ 20 more men (permanently in tending operations alone) than a comparable pulp forest. If the effect of logging and other minor employment opportunities are considered there would be substantially more jobs (perhaps double) by growing sawlogs instead of pulpwood. Furthermore this has only considered work on the forest, if the wood processing plants are considered there again more opportunities if sawlogs are grown. A modern semi-chemical pulpmill is very highly automated and employs mainly highly skilled technicians. In comparison sawmills are more labour intensive and provide employment for people less highly trained.

POLLUTION

Effluent (waste product) from pulpmills particularly chemical or semi-chemical ones is very expensive to renovate and in fact there is no 100% effective method known at the moment. In comparison sawmill wastes are relatively easy to treat.

Finally, in summary the advantages and disadvantages of sawlog and pulpwood crops are as follows:

SAWLOGSAdvantages -

1. Great flexibility in use of end product.
2. Command very high stumpages.
3. Provide large employment opportunities.
4. Labour does not have to be highly trained.
5. Ready and expanding overseas market.
6. Lower energy requirements in processing.
7. Sawmill wastes have low environmental impact.
8. Provide 50% of wood volume in pulp material.

Disadvantages

1. Long rotation
2. Relatively high investment in crop.

PULPWOODAdvantages

1. Short rotation
2. Low capital investment in the tree crop.

Disadvantages

1. No flexibility in end product.
2. Low stumpages.
3. Low labour requirements during crop life mean low employment opportunities.
4. Automated, highly complex processing plant employing skilled technician.
5. Large areas of forest overseas only suitable for chip or pulp end use. Low export opportunities.
6. Large quantities of energy required.
7. Effluent difficult to renovate.

Appendix 4.

MARAETAI MODEL CASH FLOWS.

The corrected cash flows (forest costs and forest revenues) for the afforestation of the Maraetai block are calculated in this appendix. The correct results are compared to those obtained by Grainger (1969) in chapter 4.

Appendix 4.

Maraetai model cash flows.

The following forest model is based on the 10,120 ha Maraetai block using the financial information presented by Fenton and Grainger (unpubl. 1965). Fenton and Grainger calculated a cash flow which included direct forest costs, indirect forest costs and sawlog logging costs. Indirect forest costs included protection, repairs and maintenance, salaries, accomodation, administration vehicles and general administration costs. Not included were allowances for external overheads, fire protection equipment and contingencies which Fenton and Grainger felt should be allowed for if the forest was to be developed by private enterprise rather than the state forest service.

The following model included all costs, but as in an afforestation lease the lessor has no equity in the logging operations, all costs which could be related to logging are excluded. Costs and revenues are calculated to year 40 when **a constant annual cost/constant annual revenue situation arises.**

The following changes were made to Fenton and Grainger's costs to exclude logging costs:-

1. Direct forest costs. The exclusion of sawlog logging costs.

Year	Capital equipment	Direct logging costs
38	\$172,000	\$94,600
39		\$94,600
40		\$94,600

2. Indirect forest costs. The exclusion of logging related salaries.

1 O/C logging	year 21 onwards	\$2600/annum
2 logging foremen	year 21 onwards	\$3800/annum
2 general clerks	year 21 onwards	\$3600/annum
2 logging rangers	year 23 onwards	\$4200/annum

3. External overheads. Part of the external overheads is an extra administration vehicle used for logging purposes which is excluded in this model.

Year 21 - capital cost \$2000

Year 21 to 40 inclusive - annual cost \$1200

4. Revenues. Sawlog revenue was based on an 'on the truck' pricing point, so annual revenue must be reduced by sawlog logging costs and sawlog logging profit.

Year	Direct sawlogging costs	Sawlogging profit
38	\$94,600	\$48,000
39	\$94,600	\$48,000
40	\$94,600	\$48,000

Logging profit was assessed by Grainger (1969) and is based on 10% of capital and accumulated operating costs to year 40.

The cost schedule shown in table 4A is derived by taking Fenton and Grainger's total costs, subtracting logging costs and adding those costs not included by Fenton and Grainger i.e. external overheads, fire protection equipment costs and contingencies.

To maintain comparability with Grainger's (1969) work, forest revenue is taken from Grainger (1969) who made minor changes to the revenue schedule derived by Fenton and Grainger. The forest revenue schedule shown in table 4B is derived by subtracting sawlog logging costs and profit from Grainger's revenue schedule.

TABLE 4A
FOREST COSTS
(\$000)

Year	Total Costs	Logging Costs				External Overheads	Fire Protection Equipment	Contingencies	Net Forest Investment
		Capital Equipment	Direct Costs	Salaries	Administration Vehicle				
1	133.2					5.2	0.8	2.0	125.2
2	63.8					5.2	0.8	2.0	71.8
3	76.2					5.2	0.8	2.0	84.2
4	88.8					5.2	0.8	2.0	96.8
5	78.8					5.2	0.8	2.0	86.8
6	121.4					6.5	1.6	2.0	131.5
7	94.6					6.5	1.6	2.0	104.7
8	90.4					6.5	1.6	2.0	102.5
9	96.4					6.5	1.6	2.0	106.5
10	96.6					6.5	1.6	2.0	106.7
11	129.0					7.6	1.2	2.0	139.8
12	149.8					7.6	1.2	2.0	160.6
13	142.6					7.6	1.2	2.0	153.4
14	142.2					7.6	1.2	2.0	153.0
15	142.8					7.6	1.2	2.0	153.6
16	144.8					7.6	0.4	2.0	154.8
17	144.8					7.6	0.4	2.0	154.8
18	142.6					7.6	0.4	2.0	150.6
19	124.6					7.6	0.4	2.0	134.6
20	116.6					7.6	0.4	2.0	126.6

TABLE 4A (continued)
FOREST COSTS
(3000)

Year	Total Costs	Logging Costs				External Overheads	Fire Protection Equipment	Contingencies	Net Forest Investment
		Capital Equipment	Direct Costs	Salaries	Administration Vehicle				
21	205.6			10.0	3.2	17.6		2.0	212.0
22	199.0			10.0	1.2	15.4		2.0	205.4
23	197.2			14.2	1.2	15.4		2.0	199.9
24	188.0			14.2	1.2	15.4		2.0	190.2
25	188.0			14.2	1.2	15.4		2.0	190.2
26	120.6			14.2	1.2	16.4		2.0	123.6
27	129.4			14.2	1.2	16.4		2.0	132.4
28	120.4			14.2	1.2	16.4		2.0	123.4
29	129.4			14.2	1.2	16.4		2.0	132.4
30	121.8			14.2	1.2	16.4		2.0	124.8
31	130.6			14.2	1.2	16.4		2.0	133.6
32	129.6			14.2	1.2	16.4		2.0	132.6
33	137.2			14.2	1.2	16.4		2.0	140.2
34	137.2			14.2	1.2	16.4		2.0	140.2
35	136.6			14.2	1.2	16.4		2.0	139.6
36	133.4			14.2	1.2	16.4		2.0	136.4
37	131.4			14.2	1.2	16.4		2.0	134.4
38	132.2	172.0	94.6	14.2	1.2	16.4		2.0	135.2
39	132.8		94.6	14.2	1.2	16.4		2.0	135.8
40	132.8		94.6	14.2	1.2	16.4		2.0	135.8

Table 4B.
Forest Revenue.
(\\$000)

Year	Gross revenue	Logging costs and profit	Net revenue
20	44.0		44.0
21	164.0		164.0
22	164.0		164.0
23	204.0		204.0
24	204.0		204.0
25	210.0		210.0
26	210.0		210.0
27	212.0		212.0
28	212.0		212.0
29	212.0		212.0
30	184.0		184.0
31	200.0		200.0
32	200.0		200.0
33	200.0		200.0
34	206.0		206.0
35	194.0		194.0
36	162.0		162.0
37	162.0		162.0
38	862.0	142.6	719.4
39	860.0	142.6	717.4
40	852.0	142.6	709.4

Net forest investment compounded to year 40 @ 6½% \$22,476,000
 Net forest revenue compounded to year 40 @ 6½% \$ 9,363,000

Net forest investment compounded to year 40 @ 3¼% \$10,642,000
 Net forest revenue compounded to year 40 @ 3¼% \$ 7,055,000

Assessment of lessor's share of revenue.

	Interest rate	
	6½%	3¼%
Annual forest income after year 40	(\$000)	
Interest on compounded revenue	609	229
Pulpwood - 94,860 m ³ @ \$1.10/m ³	104	104
Sawlogs - 89,200 m ³ @ \$8.16/m ³	728	728
Slabwood - 19,540 m ³ @ \$1.32/m ³	26	26
	<u>\$1467</u>	<u>\$1087</u>
Less - annual sawlog logging costs 94		
annual sawlog logging profit 48	142	142
	<u>\$1325</u>	<u>\$ 945</u>
Less - annual forest operating costs		
from table 4A	136	136
Interest on net invested capital	1461	346
Annual residual revenue	<u>-\$ 272</u>	<u>\$ 463</u>

Lessor's share of revenue @ 6½% interest $-272/1325 = -20.5\%$

Lessor's share of revenue @ 3¼% interest $463/945 = 49.0\%$

Appendix 5.

STUMPAGE TRENDS.

Stumpage trends in December 1974 values are calculated in this appendix. The trends are interpreted and presented graphically in chapter 4.

STUMPAGE TRENDS.

(1) Export logs.

F.O.B. values for export logs are derived from figures presented in the Annual Report of the Director-General of Forests. To estimate the cost of getting logs from 'on the stump' to their F.O.B. sale point, a confidential personal communication with a log exporting firm produced the following costs in 1976 values.

	\$/m ³
a. Port costs (direct)	
Commission to agents ($\frac{1}{4}\%$ of F.O.B.)	0.09
Marshalling	1.35
Stevedoring	2.74
Wharfage storage	1.36
Inspection	0.05
b. Forest to port costs (direct)	
Cartage	5.41
Roading	0.20
Logging	4.32
c. Sale costs	
Travel, negotiation, accounting, legal, tallying, commission	0.98
Rejects (1% of total export volume)	0.01
d. Other costs	
2 $\frac{1}{2}\%$ allowance for profit and risk	0.41
Administration	0.49
Total	<u>\$17.41</u>
Deflated to Dec. 1974 values -	\$13.63

Table 5A shows the calculation of export log stumpages in Dec. 1974 prices.

Table 5A.
Export Log Stumpages.

Year	Export Volume (000 m ³)	Export Revenue (\$mill)	F.O.B. Value (\$/m ³)	Deflated F.O.B (\$/m ³ Dec 74 values)	Production Costs (\$/m ³ Dec 1974 values)	Stumpage Value (Dec 1974 values)
1966	538	4.8	8.92	16.43	13.63	2.80
67	793	7.1	8.95	15.54	13.63	1.91
68	1444	16.5	11.42	19.00	13.63	5.37
69	1670	22.6	13.53	21.44	13.63	7.81
70	1820	24.8	13.63	20.28	13.63	6.65
71	1821	28.5	15.65	21.09	13.63	7.46
72	1855	30.6	16.50	20.81	13.63	7.18
73	2000	34.0	17.00	19.81	13.63	6.18
74	1450	34.0	23.45	24.61	13.63	10.98
75	695	18.0	25.90	23.70	13.63	10.07
76	986	27.2	27.58	21.60	13.63	7.97

Source:- Export volume and export revenue - N.Z.
Forest Service, Report of the Director-
General of Forests 1967 to 1977.
Production costs - as calculated
previously.

(2) Pulpwood.

A series presenting the 'delivered at the mill' cost of pulpwood was prepared by the Department of Statistics from 1966 to 1972. Unfortunately this was discontinued in 1973.

Fenton, Grainger, Sutton and Tustin (unpubl. 1968) give a harvesting cost for pulpwood of \$1.44/m³. This is \$2.41 in Dec. 1974 values. There was no data available on pulpwood transport costs, hence an arbitrary cost of \$2.00 was used. This means that the calculated stumpages may not be correct, but the trend is important.

Table 5B shows the calculation of pulpwood stumpages in Dec. 1974 prices.

Table 5B.
Pulpwood Stumpages.
(\$/m³)

Year	Delivered at the mill cost of pulpwood.	Deflated cost of pulpwood delivered at the mill (Dec 74 values)	Logging/ transport costs (Dec 74 values)	Stumpage Value (Dec 74 values)
1966	5.43	10.00	4.41	5.59
67	5.88	10.21	4.41	5.80
68	5.57	9.27	4.41	4.86
69	5.70	9.03	4.41	4.62
70	6.18	9.20	4.41	4.79
71	6.68	9.00	4.41	4.59
72	6.51	8.21	4.41	3.80

Source:- 'Industrial Production Statistics' and supplements to 'Monthly Abstract of Statistics', Department of Statistics.

Note: In the case of processing companies supplying wood from their own forests, the stumpage component of the delivered-at-the-mill cost of pulpwood may be charged on a nominal basis.

(3) Sawlogs.

Specific data on sawlog stumpages were not available except for stumpages on logs sold by the N.Z. Forest Service to its own sawmill at Waipa, Rotorua. This stumpage is set by Government policy decision and in no way reflects the true market rate for sawlog stumpages. However, the trend in deflated stumpage prices is of importance.

Table 5C shows the actual and deflated stumpages paid by the Forest Service sawmill.

Table 5C.

Stumpages Paid By Waipa Sawmill For Sawlogs.

($\$/m^3$)

Year	Stumpage paid.	Deflated stumpage paid (Dec 74 values)
1969	1.77	2.81
70	1.77	2.63
71	1.77	2.39
72	1.94	2.45
73	2.83	3.30
74	2.77	2.91
75	2.76	2.53
76	3.01	2.36

Source:- N.Z. Forest Service, Report of the
Director-General of Forests 1970 to 1977.

(4) State stumpage sales.

Data on total volume and revenue for sales of standing timber from state exotic forests were available. Sales include sawlogs, pulpwood and peeler logs, but exclude export logs. Individual figures for sawlogs, pulpwood and peeler logs were not available. The bulk of sales is radiata pine, but small amounts of other species are included.

Table 5D shows the actual mean stumpages and the deflated mean stumpages paid for standing timber.

Table 5D.
Mean Stumpages For State Exotic Sales.

Year	Total sales (000 m ³)	Total revenue (\$000)	Mean stumpage (\$/m ³)	Deflated mean stumpage (\$/m ³ Dec 74 values)
1967	1346	1774	1.32	2.29
68	1354	1890	1.40	2.33
69	1286	2096	1.63	2.58
70	1510	2958	1.96	2.92
71	1445	2188	1.51	2.04
72	1399	2268	1.62	2.04
73	1473	2669	1.81	2.11
74	1789	4024	2.25	2.36
75	2142	4888	2.28	2.09
76	2161	5220	2.42	1.90

Source:- W.Z. Forest Service, Report of the
Director-General of Forests 1969 to 1977.

Appendix 6.

PRICE INDEXES.

The consumer price index presented in this appendix is used throughout this thesis to deflate or inflate prices as required. The timber price index is referred to in chapter 4.

Appendix 6.

Price indexes.

1. Consumer price index.

Table 6A shows the consumer price index for all groups from 1950 to 1977. The base is December quarter 1974 = 1000.

Table 6A.

Consumer Price Index.

Year	C.P.I.	Year	C.P.I.
1950	299	1964	511
51	333	65	529
52	358	66	543
53	375	67	576
54	392	68	601
55	402	69	631
56	416	70	672
57	425	71	742
58	443	72	793
59	460	73	858
60	463	74	953
61	472	75	1093
62	484	76	1277
63	494	77	1439*

* - end of june quarter.

Source:- 1950 to 1976 - N.Z. Official Yearbook,
Dept. of Statistics.

1977 - Monthly Abstract of Statistics,
Sept. 1977, Dept of Statistics.

2. Timber price index.

Table 6B shows the wholesale timber price index for radiata pine. The base is 1958 = 1000. For comparison, the consumer price index for all groups, using the same base year, is also shown.

Table 6B.

Timber Price Index - Radiata Pine (Wholesale).

Year	Timber price index	C.P.I.	Year	Timber price index	C.P.I.
1950	693	675	1962	1158	1092
51	721	750	63	1182	1114
52	740	808	64	1198	1153
53	850	845	65	1252	1192
54	946	884	66	1280	1225
55	967	906	67	1325	1299
56	967	937	68	1342	1355
57	992	957	69	1397	1422
58	1000	1000	70	1506	1515
59	1024	1038	71	1744	1672
60	1056	1045	72	1789	1788
61	1064	1096			

Source:- C.P.I. - N.Z. Official Yearbook, Dept.
of Statistics.

Timber price index - Statistics of the
Forests and Forest Industries of New
Zealand to 1974. N.Z. Forest Service.

Appendix 7.

FORESTRY COST TRENDS.

This appendix presents the available information on the cost of forestry operations. Table 7A shows the costs in current terms. Current costs are adjusted to Dec. 1974 prices using the consumer price index (appendix 6), and the adjusted costs are shown in table 7B. Trends in real costs are interpreted in chapter 4.

TABLE 7A.

Current Forestry Costs

(\$/ha)

	1962	1965	1966	1967	1970	1973	1975(a)	1975(b)	1977
<u>Land Clearing</u>									
Cut Heavy Scrub	39.54			42.01		67.72	120-170		
Scrub Crushing	9.88			12.35		22.00	30-50		
Burning	1.24			1.24		2.10		12.00	
Felling of Bush	64.24			79.07		143.32	165.00		
Burn Felled Bush	2.47			2.47		4.15			20.00
Bulldoze bush slash	34.59			39.54		59.30			
<u>Establishment</u>									
Hand planting	33.41	44.00		37.91	50.00	47.77	50-90	75.00	72.00
Machine planting	8.70			24.71		24.04			
Seedlings on site (\$/1000)	17.79						60-70	19.00	22.00

cont'd.....

Table 7A continued

	1962	1965	1966	1967	1970	1973	1975(a)	1975(b)	1977
<u>Tending</u>									
Blanking	9.88			7.41		14.63	20-30	35.00	
Releasing	14.83			13.10		26.44	30-60		80.00
Pruning age 4/5	39.54		20.00	24.47	29.00		54-90	(65.00 (57.00)	105.00
Pruning age 6	44.48			33.85			51-74	65.00	81.00
Thin to Waste	64.25			54.86		39.69	50-70	80.00	(60.00 (55.00)
Dothistroma Spray				7.41				9.09	10.00
<u>Harvesting</u>									
Clearfelling	593.04			726.47		986.11			
<u>Miscellaneous</u>									
Fencing (\$/km)	994.40						400-500	1500.00	

Sources: 1962 - Ward et. al. (1966).

1967 - Fenton and Merle-Dick (1972).

1973 - Fenton and Tennant (1976). Others - confidential personal communications.

1975(b) - N.Z. Forest Service (Anon 1976c).

TABLE 7B

Forestry Costs - Dec. 1974 Values
(\$/ha.)

	1962	1965	1966	1967	1970	1973	1975(a)	1975(b)	1977
<u>Land Clearing</u>									
Cut Heavy Scrub	81.69			72.93		78.93	110-156		
Scrub Crushing	20.41			21.44		25.64	27-46		
Burning	2.56			2.15		2.45		10.98	
Felling of Bush	132.73			137.27		167.04	151.00		
Burn Felled Bush	5.10			4.29		4.84			13.90
Bulldoze bush slash	71.47			68.65		69.11			
<u>Establishment</u>									
Hand planting	69.03	83.18		65.82	74.40	55.68	46-82	68.62	50.03
Machine Planting	17.98			42.90		28.04			
Seedlings on Site	36.76						55-82	17.38	15.29
(\$/1000)									

cont'd....

Table 7B continued.

	1962	1965	1966	1967	1970	1973	1975(a)	1975(b)	1977
<u>Tending</u>									
Blanking	20.41			12.86		17.05	18-27	32.02	
Releasing	30.64			22.74		30.81	27-55		55.59
Pruning age 4/5	81.68		36.83	42.48	43.15		49-82	(59.46 (52.15	72.97
Pruning age 6	91.89			58.77			47-68	59.47	56.29
Thin to Waste	132.73			95.24		46.26	46-64	73.19	(41.70 (38.22
Dothistroma Spray				12.86				8.32	6.96
<u>Harvesting</u>									
Clearfelling	1225.10			1261.23		1149.31			
<u>Miscellaneous</u>									
Fencing (\$/km)	2054.22						366-457	1372.36	

Appendix 8.

NET ANNUAL INCOME FROM FORESTRY AND GRAZING.

The net annual income from forestry and grazing is calculated in this appendix. The results are compared in chapter 5.

Appendix 8.

Net annual income from forestry.

Based on Fenton and Tustin (1972) a sawlog/export log regime will produce on an average site index of 34, a net logged volume of $576 \text{ m}^3/\text{ha}$ at age 23. A pulpwood regime on the same site index would produce an approximate net volume of $600 \text{ m}^3/\text{ha}$ at age 23.

The following stumpage rates (Dec. 1974 values) have been estimated based on the trends and figures shown in appendix 5.

Export logs	\$9.00/m ³
Sawlogs	\$6.00/m ³
Pulpwood	\$2.50/m ³

The gross income discounted to year 0 is shown in table 8A.

Table 8A.

Discounted Gross Income - Year 0 (\$/ha)

Product	Interest rate				
	6%	8%	10%	12%	14%
Export logs	1357	883	579	383	255
Sawlogs	905	589	386	255	170
Pulpwood	393	255	168	111	74

Fenton and Tustin (1972) give the discounted total forest growing costs in year 0 in 1967 values for sawlog/export log regime as follows:-

	(\$/ha)				
	6%	8%	10%	12%	14%
Growing costs	79	60	48	40	34

Costs adjusted to Dec. 1974 prices using the consumer price index (appendix 6):-

131	99	79	66	57
-----	----	----	----	----

Similar information for pulpwood was not available. Assuming the growing costs for pulpwood are 80% of those for saw/export logs, the net discounted revenue is shown in table 8B.

Table 8B.

Discounted Net Income - Year 0
(\$/ha)

Product	Interest rate				
	6%	8%	10%	12%	14%
Export logs	1226	784	500	317	198
Sawlogs	774	490	307	189	113
Pulpwood	288	176	105	58	28

The net income expressed as equal annual payments for 23 years is shown in table 8C.

Table 8C.

Net Annual Income From Forestry.
(\$/ha)

Product	Interest rate				
	6%	8%	10%	12%	14%
Export logs	99.6	75.6	56.3	41.1	29.1
Sawlogs	62.9	47.2	34.5	24.5	16.6
Pulpwood	23.4	17.0	11.8	7.5	4.1

Net annual income from grazing.

The net income for the farming sector for those farms most likely to be used for grazing purposes and most likely to compete with forestry for land i.e. North Island hard hill country and North Island hill country, are given on a per farm basis by the New Zealand Meat and Wool Board Economic Service (Anon 1976d), though no average farm size is given. The Report of the Agricultural Review Committee to the Minister of Agriculture and Fisheries (Anon unpubl. 1977) indicates the average size of grazing farms sold in the years 1972 to 1976 were 441, 561, 522, 677, and 532 ha respectively. An average grazing farm size of 547 ha is used in the following calculations. Table 8D shows the calculation of the average net annual income from grazing in Dec. 1974 prices. More specific information was not available.

Table 8D.
Net Annual Income From Grazing.

Year	Net annual income per farm (\$)		Net annual income (\$/ha Dec 74 values)		Average net annual income (\$/ha Dec 74 values)
	N.I. hard hill country	N.I. hill country	N.I. hard hill country	N.I. hill country	
1970	2682	7652	7.29	20.82	14.06
71	7351	6470	18.11	15.94	17.03
72	10133	8465	23.35	19.51	21.43
73	25377	22123	54.07	47.13	50.60
74	16271	15977	31.22	30.65	30.94
75	4801	5883	8.03	9.84	8.94
		Mean	\$23.68	\$23.98	\$23.83

Source: Net annual income per farm - N.Z. Meat and
Wool Board.

C.P.I. - appendix 6.

Appendix 9.

THE RATE OF RETURN FROM FORESTRY AND AGRICULTURE.

References and data on the return from forestry and agriculture are examined in this appendix in order to support the case for using agricultural land values for valuing the land owner's input to afforestation leases. The results are discussed in this appendix.

Appendix 9.

The rate of return from forestry and agriculture.

1. The rate of return from forestry.

Early work (Ward et al 1966), showed that using 1962/3 values, which corresponded to a year of average returns for farmers, agriculture was slightly more profitable than forestry. The internal rate of return for agriculture was 7.0%, while for forestry it was 6.75%. If social costs were included these dropped to 5.5% and 6.0% respectively.

The more intensive examination of forest management practices carried out by Fenton and Tustin (1972), and Fenton and Merle Dick (1972a, 1972b, 1972c), indicated that considerable increases could be achieved in the profitability of forestry through higher log export prices and shorter rotations than those commonly used at that time. The internal rates of return from these studies are summarised in table 9A. All were based on 1967 values.

Table 9A.
The Internal Rate Of Return
For Forestry.

Site index (height in m age 20)	Internal rate of return without social costs	Internal rate of return including social costs
Short rotation regimes.		
25	9.6%	8.5%
30	12.8	11.2
34	15.7	13.3
Normal regimes.		
30	11.7*	10.2
34	14.0*	12.0

* Estimated from results presented in the literature.

More recent work by Fenton and Tennant (1976) gave a return of 13.7% including social costs, on afforestation for the log export trade using 1973 costs and returns for a normal regime on site index 30. They also noted that a drop in the on the truck price for logs of 46% would still leave an internal rate of return of 10%. Forestry based on domestic log prices is therefore also likely to show a satisfactory return.

Fenton (1977) reports a consistent error in his whole series of profitability studies. The net effect of correcting the error is a small increase in the calculated profitability. The relative ranking of the different analysis remains the same.

All Fenton's profitability studies were based on the Maraetai block, which was also the basis of the work by Ward et al (1966) and Grainger's (1969) work on leasing. Although Fenton et al were able to include site index as a variable in determining profitability, other factors also have to be considered, including topography, initial vegetation and location with respect to the market, so that the results obtained by Fenton et al cannot be applied generally without modification. Furthermore, the studies were based on constant costs and returns; relative movements in costs and returns also need to be considered. Changes in costs and returns between 1967 and 1973 for a 'normal' regime on site index 30 (Fenton and Kerle Dick 1972c, and Fenton and Tennant 1976), indicate that returns have risen faster than costs resulting in the internal rate of return rising from 10.2% to 13.7%.

Macpherson (1974) examined afforestation profitability using a 25 year rotation to grow sawlogs for the domestic market. The forest was located about 50 km from the market and had a site index of 33. The internal rates of return obtained by Macpherson were 9.8% with social costs and 10.8% when they were excluded. Macpherson reported that because these figures compared more than favourably with returns from agricultural development of similar country in the area, the Land Settlement Board, which had authority over the land, released the block to forestry in preference to agriculture.

All the forestry profitability studies described above are comparable in that they exclude the cost of land and do not ascribe any of the returns to land as a factor of production.

2. The rate of return from agriculture.

For the purposes of valuing land, the Government Valuation Department divides New Zealand agriculture into the following broad categories:-

- Dairy farms
- Fattening farms
- Grazing farms
- Arable farms
- Horticultural properties
- Specialist livestock

Lach exhibits its own rate of return. Grazing farms are the most similar to forestry in that large areas of land are used extensively. The other categories are generally more specialised, involving greater levels of capital investment and tend to be smaller units subject to more intensive use.

Because farming is a continuing process, and income may fluctuate considerably on both a seasonal and annual basis, it is difficult to derive an internal rate of return as a measure of profitability. Three measures of profitability which can be applied to agriculture (Anon 1976d) are:-

(a) Return on capital - this is the ratio of net farm income to total capital involved.

(b) Capital turnover percentage - this is the ratio of gross farm income to total farm capital.

(c) Estimated labour and management residual - this is an estimate of what the farmer earns as a reward for his own labour and management.

The closest of these to the internal rate of return measure used to examine the profitability of forestry is the return on capital, as this indicates the rate at which capital investment reproduces itself after all costs have been met.

Both measures give the maximum rate of interest at which money could be lent for the project to break even.

However, despite direct requests for data on the net returns for agriculture to the Ministry of Agriculture Economics Division, Lincoln College Department of Agricultural Economics, the New Zealand Meat and Wool Boards' Economic Service and Massey University Department of Agricultural Economics, only data on gross returns were available. As a result, only the capital turnover percentage for agriculture could be calculated. However, as the return on capital will always be less than the capital turnover percentage, the capital turnover percentage will give a useful indication of what the return on capital is likely to be.

Table 9B shows the capital turnover percentage for all agriculture for the period 1961 to 1975. Gross income specific to grazing only was not available. To maintain comparability of results with those presented for forestry, the value of the land has been excluded from the measure of total farm capital.

Table 9B indicated that the return on farm capital is generally declining. The New Zealand Institute of Economic Research (Anon 1977e) notes that in late 1977 the "overall view of the farming sector is one of static values of gross farm output with input cost inflation eroding net farm income". Predictions made for the 1977/8 and 1978/9 years for all types of farming indicate a general worsening of the farmer's position. Hence the declining trend shown in table 9B may continue.

The profitability of agriculture may be further reduced relative to forestry in that all the forestry studies refer to an afforestation scheme started from scratch, whereas agriculture has been considered as a continuing activity. Plunkett (1972) examined agricultural development undertaken by the Land and Survey Department on undeveloped blocks, taking development to a stage where the block could be run as

Table 9B.
Capital Turnover Percentage For All Agriculture.

Year	Value of real farm capital (\$mill 1950 values)	Total farm income (\$mill)	Real farm income (\$mill 1950 values)	Capital turnover percentage
1961	1562	356	226	14.5
62	1625	322	199	12.3
63	1680	361	219	13.0
64	1756	422	247	14.1
65	1795	432	244	13.6
66	1837	428	236	12.9
67	1875	393	222	11.8
68	1985	398	198	10.0
69	2040	394	187	9.2
70	2103	415	185	8.8
71	2148	432	174	8.1
72	2123	559	211	9.9
73	2050	665	232	11.3
74	1897	845	265	14.0
75	2012	425	116	5.8

Source: Value of real farm capital - Ellison (1977),
Table A4. This consists of the sum of the value
of livestock, value of plant and machinery and
value of all improvements. It does not include
a land value.
Total farm income - Johnson (1977).
Consumer price index - appendix 6.

an economic unit. Using mean 1945 - 69 prices, he showed that
the internal rate of return was minus 1.7%.

3. Discussion.

The internal rate of return from forestry based on export stumpages are generally greater than the capital turnover percentage for agriculture, especially in the period since 1969. The internal rate of return based on domestic stumpages generally exceeds the capital turnover percentage for agriculture from 1969 onwards. In as much as the return on capital, a measure of profitability more directly comparable to the internal rate of return, will be less than the capital turnover percentage, forestry is likely to exceed agriculture in profitability.

This further justifies the use of agricultural land values for assessing the land owner's contribution to afforestation leases.